Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

3.231 THE DESIGN OF THE NEW COLD STORES AT TORRY RESEARCH STATION

Banks, A. and Long, R. A. K. (Torry Research Station, Department of Scientific and Industrial Research)
Modern Refrigeration 57, No. 670, 6-12 (January, 1954)

The design considerations and construction of the new cold storage facilities at the Torry Research Station are described.

There are 10 rooms approximately 10 feet square by 9 1/2 feet high at temperatures below +14°F. (-10°C.). Entry to the cold storage rooms is made through a large refrigerated air-lock, which leads into a passage in 3 sections, each at the predominating temperature of the group of rooms served.

The structure of the cold storage rooms is such that the insulation will not be pierced by the structural members of the building.

By using the jacket cooling method of refrigeration, the relative humidity in the rooms may be varied. The insulation heat leaks are removed through a refrigerated air jacket between the inner surface of the insulation and the internal lining of the room. High humidities are attained by reducing to a minimum the heat input to the air in the rooms, and low humidities by the application of an artificial heat load within the room.

The constant temperatures required are being controlled automatically with little effect on humidity. Any unavoidable heat input into a room can be removed by an air cooler and fan which are controlled independently.

(over)

 ABSTRACTER: D. T. Miyauchi

3.230 RECENT DEVELOPMENTS IN PRECOOKED FROZEN FOODS

Hanson, Helen (Western Regional Research Laboratory, U.S.D.A., Albany, California)
Journal of the American Dietetic Association 3, No. 3, 241-44 (March, 1954)

The demand from housewives, restaurants, airlines and railroads for convenient, completely cooked foods that require only thawing and reheating has caused the precooked frozen food industry to expand rapidly in recent years.

Foods now being frozen include such diverse items as waffles, soups, sandwiches, hors d'oeuvres, bakery products, and meats and vegetables alone and in combination as a meal.

Attempts to freeze many types of cooked foods have not met with complete success. Recent research has been concerned with problems in maintaining texture and flavor stability during freezing and storage. The developments considered in this paper, include: (a) the methods that have been found for preventing or substantially decreasing the liquid separation and curdled appearance in products such as sauces and gravies; (b) methods for producing stable custard- and pudding-type desserts and thickened fillings in cream puffs and cakes; (c) methods for maintaining a crisp texture in precooked frozen vegetables; and (d) a method for preventing the development of rancid flavors in precooked frozen products.

Sauces and gravies are used in a large proportion of the precooked foods now produced because they markedly increase the flavor stability of meat and poultry dishes by replacing air in the package. The chief problem with this type of product is liquid separation and the curdled appearance these products often have when thawed out. Treatments tried in an attempt to overcome this defect have included homogenization and the use of various stabilizers.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

6.195 THE NUTRITIONAL EVALUATION OF PROTEIN CONCENTRATES OBTAINED FROM THE ALKALI DIGESTION OF HERRINGS

Carpenter, K. J.; Duckworth, J.; Ellinger, G. M.; and Shrimpton, D. H.
Journal of the Science of Food and Agriculture 3, No. 6, 278-88 (June, 1952)

Protein concentrates obtained as by-products from the alkali-reduction treatment of herrings have been analysed for some important vitamins and amino-acids, and also tested as supplements to basic cereal rations for poultry. All the products showed considerable destruction of riboflavin and pantothenic acid in the process, but those prepared by the "mild" treatment have a gross protein value of 75% of that for conventional fish meals. This may be explained by the destruction of much of the cystine in the herrings during the reduction process. When a "mild process" alkali-reduction meal replaced white-fish meal in growing and laying rations of the "regulation" type used in the U. K. there was no decline in growth or egg-production. The meal had no tainting effect on either the meat or the eggs produced in these experiments.

 Author's summary

3.33 PREPARING CLAM CHOWDER

Anonymous
Food Engineering 26, No. 2, 181-82 (February, 1954)

The following directions are for making a batch of canned Manhattan-type clam chowder on a pilot plant scale:

Simmer in small steam-jacketed kettle, 3 pounds diced onions. When onions are soft, add 3 pounds of ground salt pork. Saute until pork and onions are soft but not brown. Pour in 2 1/2 gallons of water and bring to a boil.

Meanwhile, blend until smooth in a vertical, beater-type mixer, 5 3/4 pounds of cracker crumbs with 2 1/2 gallons of water. Place in kettle with onion-salt pork mixture.

Beat up a second batch of cracker crumbs -- 5 pounds of crumbs with 1 2/3 gallons of water. Then pour 2 1/2 gallons of water into kettle, bring batch to a boil, and add second batch of crumb mix. Again bring to boil and introduce tomatoes (contents of four No. 2 cans), 2 2/3 pounds of salt and 7/8 ounce of white pepper.

Dump this soup stock into hopper of a syrup-type filling machine which is commonly used in fruit canneries.

Peel, de-eye, dice, and blanch potatoes to prevent darkening. Thoroughly wash shucked clams to remove sand. Before grinding clams remove siphon and dark body portions.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

EXPERIMENTAL COLD STORAGE PLANT

NUTRITIVE VALUE OF HERRING MEAL

PRECOOKED FROZEN FOODS

PREPARATION OF CLAM CHOWDER

3.33 (Cross Reference: 1.82)

Fill into "C" enamel-lined No. 1 cans 2 ounces of potatoes and a similar amount of ground clams. Add enough hot soup stock to fill cans. Seal and heat process for at least 50 minutes at 240° F.

3.231

Temperatures of each room may be varied without affecting the temperatures of other rooms. Each room opens into an air-lock at approximately the same temperature.

Only one side of the insulation is finished. The jacket side of the insulation is left open to the circulating air, which assists the egress of moisture by evaporation. This helps the insulation to remain sound and free from ice.

By making the external surface of the insulation and room lining both vapor-sealed, the jacket evaporators should run completely free of frost. This would increase the over-all efficiency of the plant, and compressor capacity could be reduced.

The jacket cooling design will allow further studies on the desiccation of fish during cold storage by allowing variation in the humidity in the rooms without changing the temperature. An internally refrigerated room with the customary solid insulation is provided to serve as a control. There are many practical advantages in this jacket cooling system. The quality of the stored product is improved considerably. Some construction and maintenance problems are resolved by the use of standard plate-cooler units, which should remain almost frost-free.

The floor plan and specifications for the insulation and refrigeration installations are given in detail.

3.230

Investigations have demonstrated that the thickening agent -- ordinary flour, rather than shortening, milk or other minor components -- is the component which leads to instability on freezing. After testing a large number of thickening agents it was found that sauces thickened with starch or flour from the waxy cereals had superior stability. Those thickened with waxy rice flour were considerably superior to those thickened with other waxy cereal products. When waxy rice flour is used, sauces and gravies can be prepared that are completely stable for almost a year under commercial conditions. Its use on a commercial scale has been shown to cause no production difficulties.

Continuous expansion of the precooked frozen food industry depends on production of foods of high initial quality and good storage stability without undue expense. The convenience and labor-saving features of these foods are not enough; they must also be of a quality comparable to that of the freshly prepared product. Recent developments in research have increased the variety of precooked foods that can now be successfully frozen.

6.3 VISCOSITY AND MOLECULAR WEIGHT OF DEGRADED CARRAGEENIN

Masson, C. R. and Caines, G. W.
Canadian Journal of Chemistry 32, No. 2, 51-58 (February, 1954)

Carrageenin, the water-soluble polysaccharide obtained from the red alga Chondrus crispus, is of importance commercially as a gelling and suspending agent. The useful properties of this substance are undoubtedly due, in part, to the high viscosities which its solutions possess. In the course of an investigation of the kinetics of the degradation of carrageenin, the viscosities of various preparations in aqueous solution have been measured both in the presence and absence of salts. The sodium salt, prepared by means of ion-exchange techniques, was used in all experiments. For most of the viscosity measurements Ostwald viscometers of similar dimensions were employed. The characteristics of these viscometers were as follows: capillary diameter 0.0515 cm.; volume of bulbs approx. 2 ml.; flow times for water 75 to 90 sec.; mean shear gradient for water 1100 to 1300 sec.$^{-1}$; kinetic energy correction less than 1%. The temperature of measurement was 25 ± 0.1°C. A few experiments were also performed using a commercial Stormer viscometer equipped with a cylindrical rotor. Molecular weights were determined osmotically at 25°C. using 0.1 M sodium chloride as solvent. Cellophane, grade P.T. 600 was used as membrane.

Figure 1 (omitted) shows the results of viscosity measurements on a relatively low molecular weight sample of carrageenin (M = 120,000) in three solvents. In aqueous solution, the reduced specific viscosity η_{sp}/c increases markedly with dilution. In the presence of a very low concentration of added salt (0.000231 M sodium bisulphate) the plot of η_{sp}/c against c passes through a maximum at a carrageenin concentration of approximately 0.03 gm. per 100 cc. At higher salt concentrations (0.1 M sodium chloride) the plot becomes linear.

The viscosities of aqueous solutions of carrageenin of low molecular weight may be adequately represented by the Fuoss equation

(over)

 Reprinted in part

6.193 UNIDENTIFIED FACTORS IN POULTRY NUTRITION. 2. PROPERTIES AND PRELIMINARY FRACTIONATION OF A GROWTH FACTOR IN CONDENSED FISH SOLUBLES

Menge, H.; Denton, C. A.; Sizemore, J. R.; Lillie, R. J.; and Bird, H. R. (Bureau of Animal Industry, U.S.D.A., Beltsville, Maryland)
Poultry Science 32, No. 5, 863-67 (September, 1953)

Condensed fish solubles have been shown to contain an unidentified chick growth factor, or factors, In this report it is shown that the growth response obtained by supplementing chick rations with fish solubles is not due to L-lyxoflavin, known amino acids, or to the inorganic ash obtained from fish solubles. The factor was shown to be stable to autoclaving at a pH above 1.0 and up to 11.0.

A concentrate of the growth factor was obtained by fractionating fish solubles as shown in Figure 1, over.

(over)

 ABSTRACTER: W. N. Sumerwell

6.134 DRYING EXPERIMENTS 1953

Sand, G.; Gloppestad, E.; Arefjord, M.; and Arnesen, E.
Meldinger fra SSF, No. 8, 163-177 (December, 1953) (English summary)

The flame dryer for herring meal in the pilot plant at Tjaereviken is equipped for a wide variety of drying conditions. Instruments are provided for close control of the drying procedure.

The angle of inclination proved to be of major importance in dryer operation. When the discharge end of the horizontal flame dryer was raised 1 cm. per meter of dryer length, 30 percent additional air was required to transport the same amount of presscake through the dryer. When the discharge end was raised 2 cm. per meter of dryer length, 100 percent additional air was required (table 2, omitted). Raising the discharge end of the dryer increases the amount of air required at a given dryer capacity but lowers the temperature of drying (table 1, omitted). Control of the exhaust fans is of considerable importance in controlling the drying procedure when the dryer is operated in an inclined position.

The fine particles of disintegrated presscake were more easily carried through the dryer than the coarser particles (tables 3 and 4, omitted). This implies that fractionation according to particle size occurs in the flame dryer. The size of the particles found in samples drawn from the dryer at varying distances from the feed end supports this implication (table 5, omitted).

Adding condensed stickwater to the presscake increased the weight of the presscake particles. Therefore, drying a whole meal required 25 percent more air than drying an ordinary meal (table 6, omitted).

(over)

 ABSTRACTER: Martin Heerdt

6.190 RELATION BETWEEN THE QUALITY OF SOYBEAN OIL MEAL AND THE REQUIREMENTS OF VITAMIN B_{12} FOR CHICKS

Frolich, Allan (National Animal Experiment Station, Uppsala)
Nature 173, No. 4394, 132-33 (January 16, 1954)

To determine why growth responses obtained with the addition of vitamin B_{12} to an all-vegetable chick ration in one series of tests could not be duplicated in another, the soybean oil meal in the basal diet was investigated.

The chemical characteristics of soybean oil meal samples A, B, and C, as fed, appear in table 1 (this card, below). These characteristics show that soybean oil meals A and C were underheated when processed and of inferior quality as compared with sample B.

In feeding experiments using these 3 meals, chicks fed the basal diet plus 25 percent soybean oil meal B showed significantly larger weight gains than chicks fed the basal diet plus 25 percent soybean oil meal A or C (table 2, below).

Table 2. Chick Growth Experiment with Soybean Oil Meals. Gain up to Four Weeks and Efficiency of Feed. Diet: basal + 25 per cent soybean oil meal.

	Soybean oil meal		
	A	*B*	*C*
No. of chicks	50	50	50
Per cent males	56	54	64
Gain, average males-females (gm.)	181	207	186
Feed consumed per kgm. gain (kgm.)	2·53	2·38	2·52

(over)

Table 1. Laboratory Characteristics of the Soybean Oil Meals. Means of triplicate determinations

Characteristic	Soybean oil meal		
	A	*B*	*C*
Antiproteolytic activity (ref. 7)	+++	–	+++
Water-soluble protein, per cent of total protein	23·8	6·3	21·8
Urease activity (ref. 8):			
(1) Time for colour change in min.	<5	>120	5
(2) *p*H-change	2·20	0·00	2·07
Urease activity (ref. 4), m.equiv. NH_3 per gm./hr.	4·2	0·0	3·3
Formaldehyde titration:			
Initial pH	6·66	6·53	6·61
ml. 0·1 *N* sod. hydrox. to adjust to pH 9·0	3·30	2·70	3·09
ml. 0·1 *N* sod. hydrox. to titrate back to *p*H 9·0 after formaldehyde	2·81	2·43	3·60
Phenolphthalein test, per cent transmission*	21·4	46·5	22·0

* Variation found, approximately: underheated soybean oil meals, 21–24; optimum-heated soybean oil meals, 45–60; overheated soybean oil meals, more than 60.

 ABSTRACTER: Martin Heerdt

DEGRADED CARRAGEENIN

MEAL DRYING EXPERIMENTS

GROWTH FACTOR IN FISH SOLUBLES

MEAL QUALITY VS. B_{12} REQUIREMENTS

6.134

Inclining the dryer not only allows a lower temperature of drying than a horizontal dryer, but also results in the discharge of a lower temperature meal (table 7, omitted).

Extensive drying of the meal resulted in undue heating.

6.190

According to the author, these findings indicate that chicks fed an underheated low-quality soybean oil meal are quickly depleted of their vitamin B_{12} reserves, and as a consequence need larger quantities of vitamin B_{12} in their diet. This depletion may be due to either the antiproteolytic activity of the underheated meal or to its soyin (a thermolabile toxic protein) content. The antiproteolytic activity of the underheated meal, which causes a decrease in the availability of essential amino acids, however, does appear to influence the chick's requirement for vitamin B_{12}. In addition, the calcium-iron ratio and the vitamin D content of the diet must be reevaluated when feeding underheated, low-quality soybean oil meal.

Further investigation of these interrelationships is planned.

6.3

$$\eta_{sp}/c = z = A/(1 + Bc^{1/2}) + D,$$

where A, B, and D are constants. This equation has been shown to represent the viscosity behavior of a wide variety of polyelectrolytes. Figs. 2(a) and 2(b) (omitted) show plots of $1/(z - D)$ against $c^{1/2}$ for various samples of carrageenin. Included in Fig. 2(a) are points calculated from the experimental viscosity-concentration curve published by Rose and Cook for an aqueous solution of a carrageen extract. Linear plots are obtained for all the polymers.

The samples designated FA, FB, and FC in these figures were prepared from the parent material F by heating a 1% solution, buffered at pH 7.0, at 90°C. for 14.3, 38.6, and 141.4 hr. respectively. The polymers were then precipitated with ethanol, washed with freshly distilled ether, and dried in vacuo. Solutions of these polymers were dialyzed under pressure to remove any low molecular-weight products of degradation before the viscosity and molecular weight measurements were performed. The sulphate content of the dialyzed polymer increases slightly (from 25.8% to 31.7% as a result of this degradation. Sample D1 was a photochemically degraded preparation, obtained by irradiating a 1% solution of extract D for 57 min. by means of a mercury resonance lamp immersed in the solution.

The values of the constants A, B, and D in equation have been determined for the polymers represented in Figs. 2(a) and 2(b). The slopes of the lines give the value of B/A for each polymer. The intercepts at $c^{1/2} = 0$ give the values of 1/A. On account of the extremely small intercepts in Fig. 2(a), the values of A (and hence also of B) could not be determined directly for the polymers of highest molecular weight. For polymers FC and D1, however, measurable intercepts were obtained, from which values of B equal to 63 (± 10) and 71 (± 7) respectively were calculated.

The results of the osmotic pressure measurements are shown in Fig. 3 (omitted) where the reduced osmotic pressure π/c (π in cm. water) is plotted against concentration c (in gm. per 100 cc. solution). Molecular weights were calculated from the intercepts at zero concentration using the relationship $(\pi/c)_0 = 10330\ RT/M$. The values of M are given in Table I (omitted).

6.193

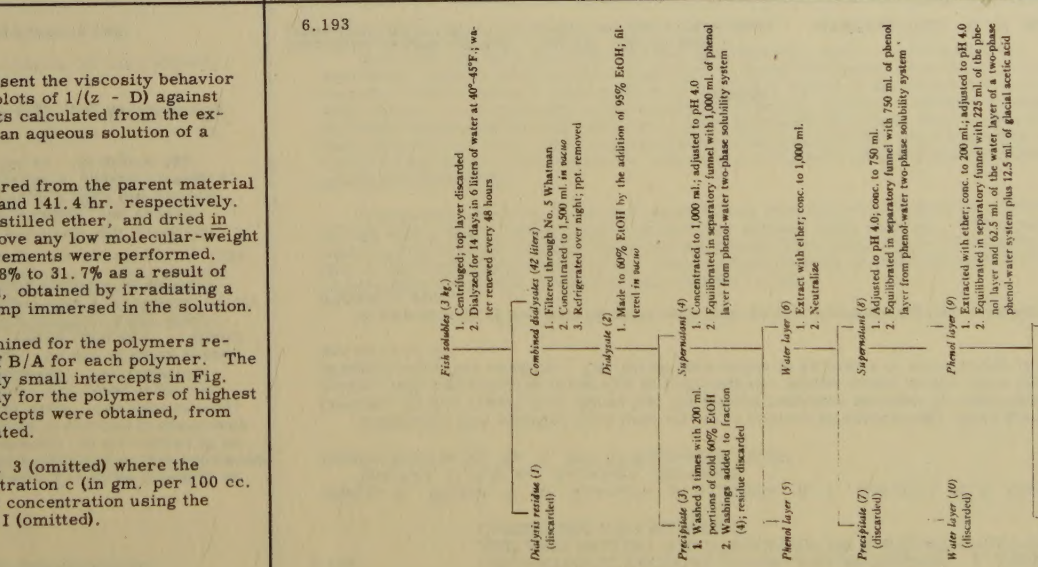
Fish solubles (3 kg.)
1. Centrifuged; top layer discarded
2. Dialyzed for 14 days in 6 liters of water at 40°-45°F.; water renewed every 48 hours
Dialysis residue (1) (discarded)
Combined dialysates (42 liters)
1. Filtered through No. 5 Whatman
2. Concentrated to 1,500 ml. in vacuo
3. Refrigerated over night; ppt. removed
Dialysate (2)
1. Made to 60% EtOH by the addition of 95% EtOH; filtered in vacuo
Precipitate (3)
1. Washed 3 times with 200 ml. portions of cold 60% EtOH
2. Washings added to fraction (4); residue discarded
Supernatant (4)
1. Concentrated to 1,000 ml.; adjusted to pH 4.0
2. Equilibrated in separatory funnel with 1,000 ml. of phenol layer from phenol-water two-phase solubility system
Phenol layer (5)
Water layer (6)
1. Extract with ether; conc. to 1,000 ml.
2. Neutralize
Precipitate (7) (discarded)
Supernatant (8)
1. Adjusted to pH 4.0; conc. to 750 ml.
2. Equilibrated in separatory funnel with 750 ml. of phenol layer from phenol-water two-phase solubility system
Water layer (10) (discarded)
Phenol layer (9)
1. Extracted with ether; conc. to 200 ml.; adjusted to pH 4.0
2. Equilibrated in separatory funnel with 225 ml. of the phenol layer and 0.5 ml. of the water layer of a two-phase phenol-water system plus 12.5 ml. of glacial acetic acid
Phenol layer (12)
Water layer (11)

FIG. 1. Preparation of Fractions of Fish Solubles.

4.64 ANTIOXIDANT EFFECT OF LIQUID SMOKES

Watts, Betty M. and Faulkner, Marian (Florida State University, Tallahassee)
Food Technology 8, No. 3, 158-161 (March, 1954)

Wood smoke contains antioxidants that can retard rancidity in meat, poultry, or fish subjected to the smoking process. Most of the known primary fat antioxidants are phenolic compounds; therefore, it is probable that the constituents of smoke responsible for its antioxidant effect are phenols. A number of liquid smoke products for flavoring meat, fish, and other foods are available, but no information is available regarding their effect on fat rancidity.

All of the four liquid smokes examined were products of the thermal decomposition of hard wood, usually hickory. They differed markedly in their characteristics,according to the information provided in table 1 (omitted). The relative antioxidant effect of these smokes was determined by the accelerated method of Lehmann and Watts (1951). An aqueous solution of 0.02 M phosphate buffer, pH 5.8, containing the compound to be tested was absorbed on filter paper in a petri dish. Rendered pork fat containing 0.1 percent carotene as an oxidation indicator was melted and poured onto a slightly smaller paper which was placed over the first paper without trapping air bubbles. The petri dishes containing the samples were sealed and stored at 45°C. for observation. Samples were designated as rancid when the carotene was one-half bleached, as determined by visual inspection.

Each smoke was tested at a dilute concentration that gave a reasonably strong smoke flavor. One part of smoke B was diluted with 4 parts of water and 5 parts of propylene glycol to yield a 10 percent stock solution before beginning the experiments. Stock solutions were not prepared from the other smokes. Each smoke was also tested at a dilute concentration in combination with ascorbic acid that had been adjusted to pH 5.8 with NaOH. Results of a typical experiment appear in table 2 (this card, over). Smokes B, C, and D gave protection. Smoke B gave strong protection even when reduced

(over)

 ABSTRACTER: Martin Heerdt

4.82 ANIMAL FATS AS A SOURCE OF ENERGY IN RUMINANT RATIONS

Dowe, Tom
Flour and Feed 54, No. 10, 13 (March, 1954)

Some of the major reasons that have been suggested for adding fats to animal feeds are:

1. Increased caloric value
2. Favorable price of the fats
3. Control of dustiness of feeds
4. Improved appearance of the feed
5. Ease of pelleting the feeds.

Fats contain approximately 2.25 times as much energy per pound as a pound of carbohydrate and, in general, fats are more completely digested than carbohydrates.

Cattle feeding research has shown that rations containing high levels of fats or oils may cause digestive disturbances when fed in excessive amounts. The data available indicate that the tolerance level of ruminants for fats and oils is between 1 and 1 3/4 pounds of fat and/or oil per thousand pounds of body weight.

The percentage of saturated and unsaturated fatty acids may have an influence on the animal reaction to the total fats and oils fed. It is known that fats and oils from different sources have different proportions of saturated and unsaturated fatty acids, and it has been shown that cattle apparently digest fat with high levels of unsaturated fatty acids more completely than they do fat with high levels of saturated fatty acids.

 ABSTRACTER: Kathryn L. Osterhaug

7.51 THE ULTRAVIOLET SPECTRUM AND BASICITY OF "ACID-SOLUBLE" CHITIN

Zimmerman, Howard K. Jr.
Journal of the Fisheries Research Board of Canada X, No. 8, 585-589 (November, 1953)

The acid-soluble fraction of crab shell chitin was obtained by dissolution in hydrochloric acid. The acid extract was filtered and the acid-soluble chitin was precipitated by adding a slight excess of sodium hydroxide to the filtrate.

Solutions of acid-soluble chitin were prepared in dilute HCl and the ultraviolet absorption spectra were obtained. No absorption bands were found, but a small dip in the absorption curve was observed at 240 mμ. This irregularity in the spectra was attributed to the formation of a complex between hydronium ion and the chitin molecule.

The reaction between chitin and hydronium ion is represented by

$$ChH^+ + H_2O \rightleftharpoons Ch + H_3O^+$$

The structure ChH^+ is termed the "chitonium" complex. The equation for the acidity constant of the complex is

$$K_a \rightleftharpoons \frac{(H_3O^+)\ (Ch)}{ChH^+}$$

The acidity constant was found to be 0.42 by ultraviolet spectra measurements and 0.435 by titration.

 ABSTRACTER: W. N. Sumerwell

7.879 ESTIMATING CARBONYL COMPOUNDS IN RANCID FATS AND FOODS

Henick, A. S.; Benca, M. F.; and Mitchell, J. H. Jr.
Journal of the American Oil Chemists' Society XXXI, No. 3, 88-91 (March, 1954)

The determination of carbonyl compounds produced during the autoxidation of fats and oils may be a satisfactory test to correlate with flavor changes in fats and foods containing fats.

The method described is based upon the formation of 2,4-dinitrophenyl hydrazine derivatives of the carbonyl compounds which can be estimated colorimetrically.

In the case of fats, a weighed sample is dissolved in carbonyl-free benzene and an aliquot is mixed with 2,4-dinitrophenyl hydrazine. Trichloroacetic acid is used to acidify the mixture. The formation of the 2,4-dinitrophenyl hydrazones is carried out by heating the reaction mixture in a 60°C. water bath for 30 minutes. After cooling, the solution is made alkaline with KOH to develop color. Carbonyl-free absolute ethanol is added as a diluent and the absorbency of the diluted solution is read at 430 and 460 mμ against a blank of carbonyl-free benzene.

If the determination is to be applied to a fat-containing solid food, the sample is ground and mixed with a measured volume of benzene. The mixture is shaken and centrifuged. Aliquots of the benzene layer are used for the carbonyl determination.

From the readings made at the two wavelengths, it is possible to calculate both saturated and unsaturated carbonyl contents.

 ABSTRACTER: W. N. Sumerwell

4.64 (Cross Reference: 3.4)

to a concentration of 0.01 percent of the aqueous phase in subsequent experiments.

Smoke B with and without ascorbic acid was also tried as an antioxidant for frozen ground pork. In these tests the stock solution of B was mixed with water or water containing ascorbic acid in the concentrations desired before being mixed with the fresh ground pork. In every instance the total liquid added was 2 percent of the weight of the pork. The pork was packaged as 50-g. patties in polyethylene bags, frozen, and stored at -17° C. (0° F.). A very dilute aqueous suspension of butylated hydroxyanisole (BHA) prepared from a 5 percent stock solution in propylene glycol, and a very dilute ascorbic acid were also tried as antioxidants for frozen pork. A uniform distribution of BHA in ground pork was difficult to achieve; consequently, the effectiveness of BHA probably was limited. The results of these experiments (tables 3 and 4, adjacent) show the prolonged protective effect of liquid smoke at the 0.4 and 0.2 percent levels. Ascorbic acid alone accelerated rancidity development in pork, but in combination with smoke B, ascorbic acid exhibited a synergistic effect and protected the frozen pork against rancidity development.

TABLE 2
Antioxidant effect and phenol content of commercial liquid smokes

Liquid smoke added [a]	Days to turn rancid at 45° C.[b]		Phenols [d]
	No ascorbic	0.1% ascorbic	
Control, buffer pH 5.8 [c]	8	0.2	—
A. 0.1%	8	0.2	0
B. .04%	50	>90.0	+++
C. 1.0%	32	>90.0	+++
D. 1.0%	14	>90.0	+++

[a] Percentages represent final concentrations in aqueous phase.
[b] As indicated by half bleaching of carotene.
[c] All experiments carried out in .02M phosphate buffer, pH 5.8.
[d] Qualitative Millon's test.

TABLE 3
Comparison of several antioxidants on rancidity in frozen ground pork [a]

Antioxidant used	Peroxide number [e] after storage at -17° C. (0° F.)	
	6 months	11 months
Control	20.2	168
Ascorbic Acid, .1% [f]	61.2	223
BHA, .01%	7.9	72
Liquid Smoke B, .04%	0.0	0

[a] All samples contained 1% sodium chloride.
[f] Adjusted to pH 6.0.
[e] Milliequivalents per 1000 g.

TABLE 4
Synergistic effect of liquid smoke and ascorbic acid in frozen ground pork [b]

Meat additives	Peroxide number [j] after storage at -17° C. (0° F.)	
	3 months	6 months
Control	12.2	38.1
Ascorbic Acid, 0.1% [i]	18.4	70.5
Liquid Smoke, B, .02%	6.0	20.0
Ascorbic Acid + Smoke [i]	0.0	5.9

[b] All samples contained 1% sodium chloride.
[i] Adjusted to pH 6.0.
[j] Milliequivalents per 1000 gm.

4.82 (Cross Reference: 4.90)

1.85 FISH HANDLING AND PROCESSING IN U.S.A.: ICED, FROZEN, CANNED AND DRIED SHRIMP

Empey, W. A. (Division of Food Preservation)
Fisheries Newsletter (Australia) 13, No. 1, 11, 15 (January, 1954)

Iced shrimp are marketed both uncooked and cooked. Uncooked shrimp are marketed whole or with the heads removed. The latter is more common. Heading is usually done after landing.

Those shrimp that are cooked before marketing are usually cooked directly in boiling salt brine. They are then chilled to approximately 34° F. and packed in 1-gallon or 5-gallon paper-lined, water-tight cans which are finally packed in ice.

In Alaska, freshly-caught shrimp are stored whole on deck in wooden boxes, each holding from 150 to 200 pounds. Ice is not used because the prevailing temperatures are low and the shrimp are landed within about 8 to 10 hours of catching.

At the factory the whole shrimp are precooked in fresh boiling water heated by the injection of live steam until they rise to the surface and float. The precooked shrimp are placed on small wooden trays with galvanized wire-mesh bottoms and cooled overnight in racks. The meats are then picked from the shells by hand and are returned to the cooling trays. After they have been rinsed with sprays of cold water, they are drained and then submerged for from 1 to 3 minutes in boiling 30° salinometer brine.

When marketed as chilled cooked shrimp the meat is packed dry in one-gallon cans and surrounded by ice. Small quantities are shipped by air in this form but most of the product is now shipped after being frozen.

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 ABSTRACTER: Kathryn L. Osterhaug

1.85 FISH HANDLING AND PROCESSING IN U.S.A.: HANDLING SHRIMP

Empey, W. A. (Division of Food Preservation)
Fisheries Newsletter (Australia) 12, No. 12, 11, 13 (December, 1953)

Of the total annual catch of shrimp in the United States about 42 percent is marketed fresh, 35 percent frozen, 15 percent canned, 5 percent dried, and 3 percent cooked and peeled. During recent years the proportion of frozen shrimp has markedly increased at the expense of the canned product.

A large proportion of the shrimp marketed throughout the world come from the waters in and around Louisiana and the other Gulf and South Atlantic states. About 95 percent of the average annual catch in this area, amounting to about 80,000 metric tons, is made up of the common shrimp, Penaeus setiferus. The remaining 5 percent is divided between the closely related species, Penaeus brasiliensis and Xiphopenaeus kroyeri. Several other species of shrimp are taken in small quantities in Alaskan waters.

Practically all the shrimp are caught in otter-trawls by power boats with crews of one, two or three men, depending on the size of the vessel. The total number of boats engaged in shrimp fishing is between 3000 and 3500.

After dragging for 1 to 3 hours the net is hauled in and emptied. The catch is sorted and the selected shrimp are washed with sea water. During the first few days of a long trip it is customary to head the shrimp before washing.

Shrimp are usually iced within two hours of emptying the nets. They are stored in bins in the ship's hold in layers of 2 to 4 inches with ice on the floor, between the layers and on the top and sides.

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 ABSTRACTER: Kathryn L. Osterhaug

2.115 DEVELOPMENT OF THE NEW ENGLAND TRAWLER

Simpson, Dwight S.
World Fishing 3, No. 3, 121-122 (March, 1954)

The yawl Resolute was the first recorded American beam trawler, built in 1891 by A. D. Story of Essex, Mass. Other abortive attempts at trawling were made during the following dozen years, both with steam and sail and with and without English crews, but it was not until 1904 that a serious attempt was made, which started the present industry. In that year the steam trawler Spray was built, and others followed, until a considerable fleet was operating out of Boston. Considerably depleted during the first World War, the fleet was rapidly rebuilt and, in 1926, 43 such vessels appear in the Register. The majority were from 135-140 ft. in length. During those years the sailing fleet had taken to auxiliary power, first the petrol engine, then the Diesel. By 1902, a considerable fleet of these converted schooners, with topmasts and bowsprits removed and sail reduced to a riding sail, were in operation.

The next step was to build vessels for the service, and in 1918 came Pioneer and in 1919 Mariner and Fabia. Mariner had a Diesel-electric drive, the only such unit ever to be installed in the New England fleet. Fabia was 131.6 ft. in length. Her main engine was by New London Ship & Engine Co., developing 360 h.p. at 240 r.p.m. It developed a speed of 9 knots in "a smooth sea."

The building of Diesel trawlers developed rapidly and the big steam trawler became a thing of the past. By 1939, only 23 appeared on the Register, as compared with 88 Diesel-powered craft of 100 tons of more. The second World War again depleted the fleet. After a temporary upsurge in building in 1945-47, misfortune hit the industry and to all intents and purposes, building ceased.

The author goes on to discuss in the light of present conditions the type of vessel indicated to achieve maximum efficiency; it is to be noted that vessels nowadays make fewer and longer trips, while

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 Author's summary

1.1 LIVE BAIT FISHING FOR TUNA IN THE CENTRAL PACIFIC

Ikehara, Isaac I.
Special Scientific Report: Fisheries No. 107, U. S. Fish & Wildlife Service , July, 1953, 20 pp.

The report contains information about baits, fishing areas, and fishing vessels used in the Central Pacific tuna fishery. Specific areas discussed are the Hawaiian Islands, Leeward Islands, Line Islands, and Phoenix Islands.

Species of bait considered and their value are as follows: (a) Hawaiian anchovy (Stolephorus purpureus) -- good chumming behavior; many available around main Hawaiian Islands; can't keep longer than two days, caught by beach seining and lift-nets with light attraction; (b) silverside (Atherina insularum) -- good chumming behavior; reasonable quantities found throughout Leeward Islands; have been kept in bait-well up to twenty days; caught mainly with beach seines; (c) round herring (Spratelloides delicatulus) -- good chumming action; found mainly around Leeward Islands in fair quantities; can hold only one or two days in bait-well; caught with lift-net using light to attract; (d) mountain bass (Kuhlia sandvicensis) -- good chumming action; large quantities found around Leeward Islands; keep well in bait tanks; caught by beach seines; (e) mullet (M. longimanus and M. vaigiensis) -- mullet up to six inches long and in good condition produce good chumming action; most valuable as bait and found in usable quantities around Line and Phoenix Islands (other species of mullet are found around Hawaiian and Leeward Islands, but are not used as bait because of high market value); can stand long periods in bait-well; caught with beach seines; (f) goatfish (Mulloidichthys sp.) -- suspect sounding tendency when used as chum; found in fair quantities around Leeward Islands in shallow water (some found in Line and Phoenix Islands); have market value in Hawaii; last long periods in bait tank; caught with beach seines; and (g) top minnows (Mollienesia sp.) -- tend to sound when used as chum; occur in fair quantities around Hawaiian Islands in streams and estuaries; caught with seines.

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 ABSTRACTER: M. R. Greenwood

U. S. SHRIMP INDUSTRY

NEW ENGLAND TRAWLER

HANDLING SHRIMP

CENTRAL PACIFIC TUNA FISHERY

2.115

the power plants are often considerably increased because of the desire for higher trawling speeds. In these days, union-enforced short time trips and 3-day lay-ups between trips have further curtailed fishing time so that, where not many years ago 30 trips a year was not an uncommon performance, 22 trips made a good record today, 24 are an unusual accomplishment and 18 or 20 are common. The redfish is dominant and plentiful and many vessels bring full cargoes nearly every trip.

The present day trawlers spend three times as many days free running as they do fishing, so that speed together with capacity is much in demand. But the aim now is primarily for a fast freighter that can fish both winter and summer. Many vessels have been re-engined in recent years with greater power. Some of these have shown considerable improvement in running speed while others have been disappointing in this respect. The same is true of the few new vessels which seem greatly overpowered.

It is considered that factory ships will probably not make much progress in New England, owing to the fact that crews will not stay out long enough to make profitable trips. The bulk of the fish will be prepared ashore. Trawlers will go further, and the trend will be towards larger, longer and even faster vessels. The author strongly advocates the controllable pitch propeller.

It is noticeable that all new boats either building or contemplated are of wooden construction. The reason is one of economies. In the spring of 1953 bids indicate the cost of a wooden vessel to be about 75 percent of the cost of steel construction. The author considers that a properly designed and built wooden vessel is as good as, if not a better, performer as a fishing vessel than one of steel.

1.1 (Cross Reference: 2.12)

All the bait available around the main Hawaiian Islands is being exploited. Although bait has been found around the Leeward, Line, and Phoenix Island groups, only small amounts have been utilized, and it is possible that with more searching and with gear better adapted for fishing the rugged shoal waters more bait fish can be discovered and caught.

Most of the tuna fishing was done around the main Hawaiian Islands and the Line and Phoenix Islands. The best results in pounds per unit of effort were obtained within three miles of the leeward shores of the Line Islands. Yellowfin tuna were caught around the Line and Phoenix Islands, and skipjack made up nearly all of the catches around the Hawaiian Islands.

Tuna schools were located mainly with the aid of flocks of birds. Occasionally schools were located by "breezing" or "jumping" fish, or by the presence of porpoises. Several schools were located in the Line and Phoenix Islands by trolling. Yellowfin schools were found to consist of fish of various sizes, making fishing difficult.

Present data indicate that yellowfin are present in the Line and Phoenix Islands both during the Hawaiian skipjack season and during the Hawaiian off-season (northern winter).

The tuna fishing in the Line Islands compares favorably with the Hawaiian fishery but does not measure up to the West Coast tuna fishery as far as catch per day or days out for a 200-ton load are concerned. Sharks interfered with the working of 10 out of 36 schools in the Line Islands.

It is thought that a more maneuverable boat than a tuna clipper would result in better catches in the Line Islands because of the "wildness" of the yellowfin tuna schools found there, the roughness of the water, and the lack of live bait. The Hawaiian sampan would be ideal except for its small carrying capacity and its limited cruising range.

1.85

Most frozen shrimp are prepared from raw shrimp from which the heads have been removed. Cooked shrimp tend to become tough during frozen storage. When cooked prior to freezing they are generally used within a relatively short period.

During the past three years there has been a rapid development in the production of frozen shelled shrimp meat in consumer-size packages. About 8000 metric tons were prepared in this manner during 1951. The recent trend has been toward the 12-ounce consumer package containing unglazed shrimp. The shrimp are packaged in waxed, laminated paper-board cartons, with an inner covering sheet of paper that does not soften when exposed to moisture.

Another recent development has been that of "breaded" shrimp in the small package. The annual production of this pack is now about 8000 metric tons.

A small proportion of the total frozen shrimp is now produced at sea in catching vessels specially equipped for packaging and quick freezing freshly-caught shrimp.

Sun-dried shrimp are produced in Louisiana from one of the small species of shrimp. After precooking in boiling salt water for about half an hour, the shrimp are drained and spread, not over three inches deep, on wooden platforms exposed to the sun. They are turned often with wooden rakes to promote drying and are covered at night and when rain threatens by a tarpaulin placed over trusses. With good weather conditions the drying process can be finished in about two days. The yield of the dried product is about one-eighth of the weight of the whole raw shrimp.

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Sometimes the shrimp are precooled rapidly in tanks containing sea water and slush ice before they are iced in the conventional manner. Some vessels have obtained excellent results by holding shrimp for periods up to 12 days in refrigerated sea water at 32° F.

At the plant the shrimp are unloaded with hand shovels onto rubber conveyor belts that carry them to metal wash tanks. After washing and tumbling to remove the excess water the shrimp are carried to a sorting and inspection conveyor. Following sorting the shrimp are weighed. The treatment from this point varies according to the type of product that is to be prepared.

Although many operations are now mechanized, heading is still done entirely by hand. "Picking" or "peeling" to obtain the raw meat free from shell is still done mainly by hand, although different types of recently-developed machines are now coming into use. Removal of the intestinal tract or "sand vein" is carried out on a large proportion of the shrimp to be processed. Several different types of mechanical devices are used for this operation. Grading of shrimp for size is also done mechanically by the use of a vibrator with holes of various sizes for the shrimp to fall through.

2.02 CHANGES IN THE pH AND BUFFERING CAPACITY OF FISH DURING SPOILAGE

Cutting, C. L. (Dept. of Scientific and Industrial Research, Torry Research Station, Aberdeen)
Journal of the Science of Food and Agriculture 4, No. 12, 597-603 (December, 1953)

The amines and ammonia produced in stale fish cause an increase in pH that has been investigated as a test for the freshness of whole fish and fillets. The most recent works on this subject (Elliott, 1947 and Kondrup, 1948) conclude that such tests are not reliable.

Experimental:
The species used in this study consisted of trawl-caught marine demersal fish, gutted, washed and kept covered with ice; drifter-caught herring, iced, ungutted; seine-caught fresh-water fish, gutted, washed, and iced; and sterile samples of fish flesh, crabs, and warm-blooded animals stored in air at 0°C.

Usually 6 to 10 similar specimens were minced together for a sample. The experimental procedure of Stansby and Lemon (1933), slightly modified, was used to measure buffering capacity. Samples (5 g.) of flesh were minced and dispersed in 100 ml. of distilled water. The pH of this suspension, after additions of N/60 - HCl or NaOH, was determined at 20°C. by means of a glass electrode and valve potentiometer. Once titrating liquid had been added, the pH invariably drifted back, rapidly at first, and then more slowly, presumably because of the mechanical obstruction of pieces of muscle to the penetration of ions. There was no drift when 'actomysin' suspensions extracted by the method of Edsall (1930) or muscle ultra-filtrates were titrated.

The muscle suspension was titrated in steps to bring the pH to certain fixed values by rapid initial additions. These were followed by subsequent small additions to counteract the rapid drift

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 ABSTRACTER: Martin Heerdt

3.33 PASTEURIZATION OF CRAB MEAT

Anzulovic, J. V. and Reedy, R. J.
Fishery Leaflet 415, U. S. Department of the Interior, Fish and Wildlife Service (February, 1954)
7 pp.

Experiments were conducted in which the fresh-cooked meat of blue crabs Callinectes sapidus was pasteurized to determine the effect of the process on keeping quality, flavor, odor, pH, destruction of E. coli, and total bacteria. The pasteurizing temperatures and times most suitable for use in commercial practice also were studied.

Previous attempts by other workers to preserve the quality of fresh-cooked crabmeat in one-pound containers by using heat above the boiling point of water resulted in discoloration, shrinkage and loss of weight. In these experiments temperatures below the boiling point of water were used.

Samples were packed in No. 2 flat enameled cans, closed with a double seam in a hand sealer and pasteurized in a water bath. The water temperature was maintained five degrees above the desired temperature of the crabmeat. Internal temperatures were determined by means of a thermometer inserted in one of the cans so that the bulb would be in the center of the meat. When the desired temperature was reached the heat was regulated and the samples held at that temperature for the period of time selected. The following temperatures and times were used.

145° F. for 30 minutes
150° F. for 20 minutes
155° F. for 15 minutes
160° F. for 10 minutes
170° F. for 1 minute

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 ABSTRACTER: Roy C. Stevens

2.3 HOW FISH FILLETS ARE MACHINE PROCESSED

Anonymous
Food Engineering 26, No. 2, 120-123 (February, 1954)

A company in East Gloucester, Massachusetts is now employing a battery of seven deheading and eight filleting machines to produce 1,200 pounds of ocean perch fillets per minute. New, highly-efficient machines and mechanized handling have made this feat possible.

Ocean perch are unloaded from the fishing boats in 125-pound capacity canvas baskets and dumped into a de-icer which removes the ice so that a true fish-weight can be obtained. The fish then pass over an inspection table where any large pieces of ice, trash fish and sub-standard ocean perch are removed. From the inspection table the fish are carried through two continuous weighing hoppers of 400-pound capacity each.

A series of conveyors and flumes take the fish to the processing plant, with any excess going to a storage room to be held in ice until needed.

The first plant operation is the mechanical removal of heads from the fish. A conveyor belt feeds a battery of seven twin heading machines, each of which puts out approximately 100 headless fish per minute. Two men are required at each machine to position the fish on metal cleats mounted on two chain-type feed conveyors. A 10-inch diameter rotary knife cuts off the heads of the fish which are arranged with gills facing an angle iron stop. The heads are sent to a reduction plant while the bodies are flumed to a 3- x 14-foot rotary scaler with a capacity of 15,000 pounds hourly.

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 ABSTRACTER: Kathryn L. Osterhaug

2.3 FILLETS FISH AT 100 PER MINUTE, OF VARYING SIZES IN ANY ORDER

Anonymous
Food Processing 15, No. 4, 83-84 (April, 1954)

Semi-commercial tests have been conducted with a newly-developed fish filleting machine said to be capable of filleting 100 fish per minute. Limited commercial production has begun for lease of the machines to fish processors. The unit is designed to handle all flat fish such as sole, flounder, halibut, and related types.

The fish are fed into the machine tail-first by a single operator. This method is contrasted with hand-filleting at the rate of four to seven fish per minute. The 100-fish-per-minute capacity is based on large fish such as Dover sole. The actual feeding rate at the present stage of the machine's development is governed by the proficiency of the operator, but it ranges from about 45 (for larger fish) to 70 fish per minute.

More meat is said to be recovered per fish than by hand, since the machine cuts closer along the plane of rib bones and adjacent to the backbone. More meat is also saved from the nape region.

Both fillets are removed at the same time as the fish is conveyed through the unit. Installations to be made in the Pacific Northwest this coming season will include automatic beheading devices, and the beheaded fish will be carried to the filleting unit in proper tail-first position on a four-foot conveyor.

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 ABSTRACTER: Roy C. Stevens

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A stainless-steel wire-mesh conveyor delivers the scaled fish to a battery of eight automatic filleting machines. Each machine can take care of 75 fish per minute.

The headless, scaled perch are hand-fed, back down and tail forward, into a trough-shaped flight conveyor with six pairs of mechanical grippers which hold the fish in exact alignment with the center of the machine and the cutting units. The fish are now guided to the first cutting units -- a pair of high speed circular knives positioned one above the other, with the lower edge of the top knife offset 0.125 - 0.187 inch from the top edge of the bottom one in such a manner as to make parallel cuts on each side of the backbone. The fish are ejected from the circular cutters to a pair of parallel ribbing knives (19 inches long) and a circular knife, and the filleting operation is completed.

From the filleting machines the fillets are sluiced to a conveyor which drains them and deposits them on a candling or inspection belt. From the inspection belt they go to a brining tank where they are treated briefly with 12-15° salinometer brine.

From the brining tank the fillets go to a packaging table where 20 girls are employed packing fillets into cartons. Placed on a conveyor, the cartons are carried to an automatic packaging unit which overwraps them in printed cellophane, waxed paper or laminated foil. The fish are then frozen and held at 0° F. until shipped to various outlets.

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The machine is cleaned continuously during operation by water sprays and brushes. After use the unit can be opened for easy clean-up. All internal moving parts are water lubricated. The machine in its present form, without the feeding conveyor, is seven feet long by two-and-one-half feet wide and weighs 600 pounds. A single 2 h.p. motor is used.

Tests with the original machine indicate that the design can be adapted to other fish such as salmon, cod, and haddock. Fish up to 18 inches wide and 4 inches thick can be accommodated.

2.02

until relative equilibrium had been attained. According to Bate-Smith (1938), buffering capacity is expressed as the 'buffering power', β, of van Slyke, defined as $db/d(pH)$, where db is the amount of base in mg. equivalents required per 100 g. of muscle to produce an increment $d(pH)$ in pH. Values for β are convertible into the A and B values of Stansby and Lemon. Average values over certain ranges of pH were calculated because drift prevented an accurate titration curve to which tangents could be drawn in order to derive values of β at various pH values for whole muscles. Individual values were not reliable to within ±5 percent because titrations were not reproducible to within ±0.5 ml.

Buffering constituents of fresh fish muscle: Table 1 (below) gives the extreme values calculated for β in various pH ranges from the data for fresh haddock muscle.

Buffering constituents of fish muscle during spoilage: Figure 1 (omitted) shows changes in β in various pH ranges for haddock stored in ice. Other marine teleosts behaved similarly. Figure 2 (omitted) gives the values for β in different ranges for whiting, and β 4.3 - 4.65 for a number of other species. β 4.3 - 6.0 is plotted in Figure 3 (omitted) because of its relevance to the 'freshness index' of Stansby and Lemon. Pieces of cod muscle kept in stoppered tubes under aseptic conditions developed no putrefactive odors even after 10 weeks at 0°, and the buffering capacity and pH showed no marked trend compared with control pieces and iced fish, figure 4 (omitted).

Post-mortem changes in the pH of fish muscle: Typical pH changes of haddocks and whiting obtained with a probe glass electrode immediately post mortem, are shown in figure 5 (omitted).

Table I

Average buffering powers of the major constituents of fresh haddock muscle (mg.-equiv. of base per 100 g. of muscle per unit pH change)

Component	Concn. (g. per 100 g. fresh muscle)	Range of pH 4·3–4·65	4·65–5·3	5·3–6·0	4·3–6·0	6·0–7·0	7·0–8·0	8·0–9·0	9·0–10·0
'Myosin'	11·6	1·8	0·7	0·0	1·5	0·7	0·7	0·7	1·0
'Myogen' etc.	4·4	(0·7)	(0·3)	(0·4)	(0·5)	(0·3)	(0·3)	(0·3)	(0·4)
Lactic acid	0·2–0·6	1·1–3·2	0·5–1·4	0·2–0·5	0·5–1·5	0·0	0·0	0·0	0·0
Orthophosphate	0·15	0·0	0·0	0·7	0·4	2·6	1·7	0·5	0·0
Trimethylamine oxide	0·1–0·3	1·0–2·9	0·5–1·5	0·2–0·5	0·5–1·5	0·0	0·0	0·0	0·0
Total	—	4·6–8·6	2·0–3·9	2·4–3·0	3·4–5·4	3·6	2·7	1·5	1·4
Whole fresh muscle	—	5·7–9·5	3·6–5·4	2·9–3·3	3·7–5·6	3·7–4·6	4·0	3·3	3·3

3.33 (Cross Reference: 1.86)

These represent the time-temperature combinations below the boiling point of water which kill the majority of organisms that cause spoilage of fresh-cooked crabmeat.

The results of the experiments, as determined organoleptically, bacteriologically, and chemically, indicate that pasteurization does not in any way impair the color, odor, or taste of crabmeat; that pasteurization kills a large number of organisms including E. coli; and that the change in pH with pasteurization is insignificant.

The pasteurizing of crabmeat commercially requires no additional equipment other than a double seamer and a supply of C-enamel lined cans. The cans should be sealed as soon as they are filled and weighed, and placed in ice or in a refrigerator until enough have accumulated to fill a retort. The cans should be dumped into the retort basket in a manner such that the largest possible surface of each can will be exposed to the hot water. The water of the retort should be at the proper temperature before the cans are actually placed in it. For example, if the operator should decide to pasteurize the crabmeat at 170° F. (this temperature is recommended), the water should be heated to 175° F. prior to placing the cans in it. When the cans have been added and this temperature is again reached, it should be held constant throughout the pasteurizing period. Half-pound cans should be kept in water at this temperature for 70 minutes, and the one-pound cans for 103 minutes. After the cans are thoroughly chilled in cold water, they are ready for shipment or storage in crushed ice or in a refrigerator.

The pasteurization of crabmeat in cans does not make it possible to keep the meat indefinitely. It does not destroy all bacteria, although it does kill E. coli, pathogenic organisms, and about 99 percent of other microorganisms. If the crabmeat is properly pasteurized and held at a temperature not exceeding 43° F., it will remain in edible condition for at least six weeks.

3.12 ANTIBIOTICS IN FOOD PROCESSING

Lewis, J. C. and Michener, H. D. (U. S. Dept. of Agriculture, Albany, California) and Stumbo, C. R. and Titus, Dudley S. (State College of Washington, Pullman)
Journal of Agricultural and Food Chemistry 2, No. 6, 298-302 (March 17, 1954)

The authors present a survey of the possible applications of antibiotics in the long-term preservation of food. Three possible applications for antibiotics are discussed. (1) A highly stable antibiotic might be used to keep bacterial spores in a static condition for the shelf life of the product. (2) An antibiotic might be developed that would stimulate the germination of bacterial spores and then kill the bacteria in a vegetative phase. (3) An antibiotic might act as a synergist with heat to bring about total destruction of both spores and bacteria.

The significance of the last mentioned application to the canning industry lies in the possibility that the use of such an agent might allow substantial reductions in the severity of heat-processing for some food products and also in the possibility that more substantial margins of safety may be established for other foods that sometimes give trouble with thermophiles or other non-toxin producing bacteria. Present processes for some products represent a difficult compromise between quality and stability, particularly for the larger sizes of cans, in which the slow rate of heat penetration becomes especially important.

There are many factors, however, that must be taken into consideration in the evaluation of antibiotics for food processing. The question of safety is obvious. The physiological effects of various antibiotics, under conditions that would arise from their use in foods, have not yet been established. The cost of the additive, based on an assumed $1.00 per gram for the antibiotic and a requirement of 14 p.p.m., becomes 1.4 cents per case of No. 2 1/2 cans. Reliability of action is

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 ABSTRACTER: Roy C. Stevens

2.3 HOW TO AVOID EXCESSIVE WEIGHT LOSS IN COOKING SHRIMP

Fieger, E. A. (Dept. of Agricultural Chemistry and Biochemistry, Louisiana State University)
Canner 118, No. 14, 9-11 (April 5, 1954)

Studies were conducted to determine the effect of (1) length of time the shrimp were boiled, (2) salt or brine concentration of the cooking water, and (3) size of the shrimp upon the percentage of edible meat recovered. Peeling losses were also determined in some cases.

The results of the experiments indicate that the size of shrimp has an important effect upon cooking losses and upon the recoverable edible meat. As the size of shrimp increases, cooking losses become smaller and edible meat recovery increases. This fact, in conjunction with greater labor costs in handling and processing small shrimp, justifies the price differential for various count shrimp.

The length of time the shrimp are cooked has a definite effect on the amount of edible meats recovered. During the first four minutes of cooking or boiling there is an increase in cooking losses, and, correspondingly, a decrease in edible meat recovery. Cooking longer than four minutes results in only small decreases in meat recovery. The investigators felt that small shrimp were sufficiently cooked in two-and-one-half to three minutes of brisk boiling and large shrimp in three to four minutes. To this time should be added the two to two-and-one-half minutes required for the water to return to boiling after the shrimp were added. If the shrimp are to be frozen and stored, these cooking times could be shortened somewhat.

Length of cook and size of shrimp are both involved in the effect of brine concentration on the loss in weight during cooking and edible meat recovery. When a short cooking time of one to two

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 ABSTRACTER: Roy C. Stevens

3.7 PRESERVATION OF SEMI-DRIED PRAWNS

Venkataraman, R.; Sreenivasan, A.; and Vasavan, A. G. (Fisheries Technological Station, Kozhikode, India)
Journal of Scientific and Industrial Research 12A, No. 10, 473-474 (1953)

Most of the prawns landed on the Malabar and South Kanara coasts are beach dried. The Fisheries Department of Madras, however, manufactures large quantities of semi-dried prawns that can be stored satisfactorily for 3 months. The authors studied the effects of semi-drying by the method of Chari and Pai (1946) on bacterial count, total volatile bases, salt and moisture content.

The prawns used in the study were blanched for 2-3 minutes in boiling 6 percent brine and allowed to cool. After having been shelled, the meats were immersed in cold saturated brine (25° Bé.) for about 15 minutes, drained of excess brine, and dried at 50° C. in an electric oven to a rubber-like texture or moisture content of about 45 percent. One particular lot of prawns was hard-dried to 21.7 percent moisture to provide a product for comparison with the rubbery-textured lots.

All of the semi-dried prawns were stored in sterilized 2-ounce glass-stoppered bottles covered with paper. At two-week intervals the semi-dried prawns were analyzed for viable bacteria (using a nutrient sea water agar medium), moisture, NaCl, and total volatile bases. At the same time, the prawns were also examined organoleptically. Table 1 (this card, below) shows the effect that

TABLE 1 — EFFECT OF BLANCHING AND BRINING OF RAW PRAWNS

	Bacterial count, No./g.	Reduction in bacterial count, % of fresh prawns	Total volatile bases, mg. N/100 g.	Moisture, %	NaCl content of prawns (fresh basis) %
Fresh prawns (meat)	5,650,000	—	21·00	80·07	0·33
Blanched prawns	90,000	98·42	15·40	69·98	1·58
Brined prawns	33,500	99·45	10·20	63·07	9·97

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 ABSTRACTER: Martin Heerdt

3.4 THE DEVELOPMENT OF THE THREADING MACHINE

Hansen, C. S.
Tidsskr. Hermetikind. 38, 585-587 (1952)
Food Science Abstracts 26, No. 1, 16-17 (January, 1954)

The new automatic threading machine is the result of work carried out in Norway since 1946. Experiments showed that the smoking of threaded fish (i.e. suspended through the eyes during smoking) is preferable to the smoking of unsuspended, headed fish. The contructional problems which had to be solved were mainly those concerned with the method of moving the fish to the threading position. Two machines of modified design were completed in 1952. Sorting machines, on which experiments are in progress, are required if full use is to be made of automatic threading machines.

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ANTIBIOTICS IN FOOD PROCESSING

SEMI-DRIED PRAWNS

WEIGHT LOSSES IN COOKED SHRIMP

THREADING MACHINE FOR SMOKED FISH

3.7 (Cross Reference: 1.85)

blanching and brining had on the bacterial count, moisture, NaCl, and total volatile base content of the fresh prawns. The bacterial count of the fresh prawns was reduced 98.4 percent by blanching and an additional one percent by brining. The moisture content and total volatile base were also reduced, the latter due to the leaching action of the brine.

Table 2 shows the keeping quality of prawns processed hard-dried, semi-dried without ascorbic acid, and semi-dried after treatment with 0.025 percent, 0.05 percent, and 0.75 percent ascorbic acid based on the weight of the brine used. Brining with 0.75 ascorbic acid in the brine followed by semi-drying reduced the initial bacterial count of the prawns by 99.9 percent after 8 weeks of storage. Hard-dried prawns kept well and remained free of fungal growth even after 20 weeks of storage. In contrast, the semi-dried prawns showed extensive fungal growth and fading of color after 8 weeks of storage.

TABLE 2—KEEPING QUALITIES OF PROCESSED PRAWNS

Period, weeks	Bacterial count ($\times 10^3$/g.)	Total volatile bases, mg. N/100 g.	Moisture, %	Remarks
Control (normal semi-dried prawns)				
0	2972·00	22·4	49·16	—
2	92·47	36·4	—	—
4	29·25	40·6	46·73	—
6	2074·00	49·0	47·36	—
8	—	84·0	43·16	Slight dulling of colour; fungal growth
12	1870·00	125·0	45·73	Completely covered by fungus
20	370·00	149·8	44·51	Spoiled
Hard dried				
0	30·66	28·0	21·72	—
2	10·20	33·6	19·05	—
4	1·71	37·8	—	—
6	3·72	49·0	19·95	—
8	0·40	84·0	17·50	—
12	2·60	—	19·91	—
20	4·28	91·0	19·32	Very slight fading of colour; no fungal growth
Semi-dried with 0·025% ascorbic acid				
0	531·00	14·0	43·59	—
2	517·20	37·8	45·88	—
4	7998·00	129·0	43·52	—
6	662·70	105·0	46·79	Colour faded; fungal growth
8	—	70·0	41·59	Completely covered by fungus
Semi-dried with 0·05% ascorbic acid				
0	285·70	18·2	45·80	—
2	70·37	36·4	45·52	—
4	25·24	39·2	47·42	—
6	5·94	90·2	49·60	Colour faded; fungal growth
8	—	112·0	45·54	Completely covered by fungus
Semi-dried with 0·075% ascorbic acid				
0	11830·00	14·0	48·31	—
2	4366·00	36·6	46·91	—
4	2505·00	40·6	44·84	—
6	138·70	49·0	43·36	Colour faded; fungal growth
8	18·40	51·2	43·32	do

3.12 (Cross Reference: 3.33)

a very important consideration. To date, only subtilin has been investigated to any extent in this regard. The frequency of occurrence and stability of resistant forms of bacteria should be considered. The question of mode of action of an additive capable of accelerating death induced by moist heat is of special significance. The authors discuss these points in some detail. Two figures and four tables are presented, and 26 references are cited.

2.3 (Cross Reference: 1.85)

minutes was used, a two or three percent brine gave highest recoveries of meat. When longer cooking times were used, water gave the best recoveries; while with variations in brine concentration between one and five percent, very similar recoveries were obtained. Brine concentrations of 10 and 15 percent, however, gave higher cooking losses and lower recoveries of meat.

Peeling losses are relative to the size of the shrimp and the period at which they are caught. If the shrimp are taken soon after moulting, the shell is much thinner and of lighter weight than if they are caught in a later period in their growth cycle. Peeling was found to become more difficult with increasing concentrations of the cooking brine. In addition, as the cooking time in any one solution was increased, the difficulty of the peeling operation was also increased.

On the basis of these findings it is recommended that cooking times and brine strengths be reduced as much as possible in order to obtain maximum yields of cooked shrimp. These same conditions are also said to result in maximum frozen storage life, since development of toughness and rancidity during frozen storage are directly related respectively to length of cooking and amount of salt in the product.

2.114 NEW MARINE ENGINE INTRODUCED

Anonymous
Fishing Gazette 71, No. 3, 54 (March, 1954)

A new light-weight marine engine and vee-drive has recently been introduced that is said to deliver more power per pound than any other inboard engine in its class. The engine is a propeller-driven 26.5-h.p. unit weighing only 160 pounds.

Because of its ability to throttle down to a low speed of one mile per hour, the engine is expected to prove of great advantage on fishing vessels. Fuel consumption is said to be only 1 1/2 gallons per hour at full throttle.

The engine measures 28" long, 15" wide and 21" high. It is a four-cylinder, four-cycle, water-cooled gasoline unit with overhead camshaft valves and a piston displacement of 44 cubic inches. It has a compression ratio of 9:1, using regular gasoline.

The engine is designed for use in runabouts, cruisers, auxiliary sailboats, fishing craft and workboats, in either single or twin installation.

 ABSTRACTER: Roy C. Stevens

6.3 ON THE OCCURRENCE OF VITAMIN B_{12}-FACTORS IN MARINE ALGAE

Ericson, L. E. and Lewis, Loraine
Archives of Chemistry (Sweden) 6, No. 40, 427-442 (December 7, 1954) (In English)

The vitamin B_{12}-factors of twenty-five species of marine algae have been investigated, using E. coli and L. lactis Dorner as test organisms. The B_{12}-activity of the brown algae (Phaeophyta) corresponded to 0.07 μgB_{12} (average value for ten species); of the red algae (Rhodophyta, ten species) to 0.27 μgB_{12}; and of the green algae (Chlorophyta, four species) to 0.35 μg per gram dry weight. A sample of Vaucheria dichotoma, the only alga tested belonging to the division Chrysophyta, contained about 2.8 μgB_{12}/gram dry weight. The total activity was due to at least four different factors, three of which have been identified as vitamin B_{12} (cyanocobalamin), the main component of pseudovitamin B_{12} and the main component of factor A. The fourth factor showed properties different from those of the hitherto described B_{12}-factors and was therefore given the name vitamin B_{12s}.

Of thirty-four bacteria isolated from seawater and from three different species of marine algae, twenty-four showed a definite ability to produce vitamin B_{12}-factors in concentrations ranging from about 0.005 to 0.14 μgB_{12} per ml. fermentation broth. The same type of B_{12}-factors as those present in the algae were produced by these bacteria. Vitamin B_{12s} was found to be produced only during a certain stage of development of the bacterial cultures.

The experimental results do not indicate that seaweeds should be able to synthesize vitamin B_{12}-factors. It seems more likely that the B_{12}-factors are produced by bacteria living epiphytically on the algae and that the factors are subsequently taken up and stored by the plant. No direct evidence has been obtained that the vitamin B_{12}-factors should be needed by the algae, although some data can be interpreted on the basis of a requirement of B_{12}.

 Author's summary

6.132 PRODUCTION OF HERRING MEAL

Various authors
Meldinger fra SSF, No. 1, 12-21 (January, 1954) (English summary on page 23)

I. FORMALIN AND HERRING MEAL QUALITY
Minsaas, J. and Laksesvela, B.

Formalin is an excellent preservative for herring for short periods of time. Eventually, however, it hardens the fish protein and makes the reduction of these fish somewhat difficult. Hardening of the protein with formalin occurs more rapidly in warm weather. The formalin when combined with the protein disappears and spoilage begins at a rapid rate. Protein combined with formalin did not have a toxic effect when fed to chicks in a series of experiments, even when excessive amounts of formalin were used.

II. PRODUCTION CONTROL OF FULL-MEAL
Arefjord, M. and Arnesen, E.

Water-soluble solid matter determinations may be used to control the amount of water-soluble protein in herring full-meal. The values for water-soluble solid matter and water-soluble protein are nearly identical when they are around the 18 percent range, the tentatively stipulated minimum content. With higher or lower proportions of water-soluble protein the differences between water-soluble solid matter and water-soluble protein are larger. To date these relationships have been verified only with winter-herring full-meal.

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 ABSTRACTER: Martin Heerdt

6.134 DRYING EXPERIMENTS IN 1953. PART II

Sand, G.; Gloppestad, E.; Arefjord, M.; and Arnesen, E.
Meldinger fra SSF, No. 1, 1-11 (January, 1954) (English summary on pages 22-23)

Flame drying herring meal to an excessively low moisture content is not economical from the standpoint of fuel consumption. According to table 10 (omitted), 33 to 36 percent additional fuel is required to reduce the moisture content of the meal from 10 percent to 5 percent moisture. Table 9 (omitted) shows that drying to a low moisture content also results in higher gas temperatures at the dryer outlet.

Flame drying of herring meal should be accomplished in as short a time as possible. Part I of these experiments pointed out that the greater the quantity (load) of meal dried per hour the shorter was the time required for drying. Flame drying meal under gentle conditions even at high loads is therefore very practicable.

Table 11 (omitted) shows that the drying conditions and the volume of meal retained in the dryer are a function of the quantity (volume) of drying gas that is being used.

To follow the drying process, temperature measurements and samples of meal were taken at intervals as the herring presscake moved through the flame dryer. Drying took place fairly evenly along its entire length when the dryer was kept horizontal. However, when the dryer was elevated at the discharge end drying took place mainly at the inlet end. Tables 12, 13 and 14 (omitted) illustrate this effect and show how a heavier load tends to counteract the tendency for drying to occur mainly at the inlet.

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 ABSTRACTER: Martin Heerdt

6.134

Dryer losses are a function of the volume and the velocity of the combustion gases and the presscake particle size. Losses resulting from fine dust being blown out of the dryer can be minimized by the use of cyclones which recover these fines.

6.132 (Cross References: 1.2, 3.14)

III. A PROVISIONAL ALTERNATIVE TO FULL UTILIZATION
Anonymous

Herring meal plants not equipped with machinery for the manufacture of whole herring meal or full-meal can obtain a better yield of meal per hectoliter of raw herring by incorporating up to nearly 40 percent of unconcentrated stickwater into the presscake. Such a mixture can be dried directly in a flame dryer. A good meal results. The raw material consumption may be reduced from 6.2 to 5.5 hectoliters per bag of meal by using this method.

2.119 THE USE OF THE TRYSAIL

Anonymous
Fishing Gazette 71, No. 3, 48, 52 (March, 1954)

The trysail has been used many years to minimize the motion of a vessel laboring in a seaway, to facilitate steering, and to reduce fuel costs. Deck work, such as hauling nets and handling the catch, is made safer and easier with the steadying influence imparted by the trysail.

Because the sail is used during the major part of the time at sea, it must be made of heavy canvas and strongly roped. The writer recommends number eight canvas, which should be made mildew-proof and water-repellent. The new synthetic material Orlon is said to be ideal for this purpose because it is highly resistant to rot and wear and may be furled and stowed wet without danger. The foot and luff rope is made of manila, and is hand-sewn to the sail. The peak, tack, and clew cringles must be heavily reinforced.

The trysail may be rigged in any of several ways, depending upon the vessel's requirements. On East Coast vessels the sail is held to the mizzen boom by barrel balls, mast loops, or lap links secured along the luff. The sail is usually loose-footed and mounted on either the mizzen mast or the main mast. It is hauled taut with clew and peak tackles.

The size of the sail in relation to the size of the vessel largely determines its efficiency as an aid to propulsion. In some cases as much as one knot is added to the speed of a trysail-carrying vessel when the vessel is running with the wind on the quarter or dead aft.

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 ABSTRACTER: Roy C. Stevens

3.249 LOSS IN WEIGHT AND CHANGE IN QUALITY DURING FROZEN STORAGE OF COD FILLETS

Bramsnaes, F. and Hemmingsen, P.
Konserves 9, 4-5 (1951)
Food Science Abstracts 26, No. 1, 14 (January, 1954)

In the experiments reported, 1-kg samples of cod fillet were wrapped in ordinary parchment paper or in cellophane MSAT 300, and were then frozen and stored in a single layer in a wooden box for 5 months at -18° to -20°C. After 1 1/2 and 5 months, fillets wrapped in parchment showed a loss in weight of 2.5 and 3.5%, respectively; fillets wrapped in cellophane showed practically no loss. Since evaporation of moisture takes place mainly from the surface of the packages, it causes considerable deterioration in quality of the fish. Fillets wrapped in parchment paper were very dry and some showed yellow discoloration, but the quality of fillets wrapped in cellophane was unaffected.

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0.33 SUGAR-AMINE REDUCTONES ISOLATED

Hodge, John E. (Northern Utilization Research Branch, U. S. Department of Agriculture)
Chemical and Engineering News 32, No. 15, 1436 (April 12, 1954)

According to the author, the production of reductones by reducing sugars and amines may be an important part of the Maillard reaction. Furthermore, it may be possible to economically manufacture a commercially valuable reductone from corn sugar.

Reductones form during storage in all processed foods containing sugars and amines. These reductones have a preservative effect in that they function as antioxidants and a deleterious effect in that they participate in browning reactions which cause dark colors and off odors and flavors. In instances like the roasting of cereals, soybeans, coffee, and nuts, however, the browning reaction has a desirable effect.

The Maillard or browning reaction is a general reaction between hexoses and strongly basic secondary amines. Maximum yields (27 to 30 percent of the theoretical yield) of piperidine-hexose reductone were obtained by heating one mole of hexose with 1.3 moles of piperidine in one to three moles of absolute ethanol under nitrogen for 12 to 20 hours at 75°C. From one to 1.3 moles of anhydrous weak acid (usually glacial acetic) was added to the mixture to catalyze the reaction.

Originally, the Maillard reaction was demonstrated by combining amino acids or the amine reactant with sugars in the presence of an acid catalyst The resulting dark polymer products called melanoidins, can also be built-up from hexose reductone units. These melanoidins possess reducing power similar to reductones. In beer, they protect against atmospheric oxidation.

 ABSTRACTER: Martin Heerdt

9.7 POINT FOUR ACTIVITIES IN FISHERY TECHNOLOGY IN PERU

Jarvis, Norman D. (Office of Foreign Activities, U. S. Fish & Wildlife Service, Washington, D. C.)
Food Technology 8, No. 4, 177-179 (April, 1954)

The nature and scope of the Peruvian Point 4 fishery technology program are described.

The first task undertaken by the author, staff, and students of the recently established Peruvian Technological Laboratory was a field survey of the Peruvian canning industry. Data obtained from this survey determined the recommendations made regarding cannery equipment, production and control methods, and training in canning technology. The technique of conducting a plant survey was demonstrated to the students; then they were required to report their own findings on subsequent plant surveys.

All imported products of aquatic origin must be examined and certified fit for consumption by the Peruvian Technological Laboratory. Therefore, as soon as the laboratory was completed, instruction in the examination and analysis of fishery products was begun. Sampling and examination were clearly outlined as more than mere routine procedures. In time, the students also became proficient in making organoleptic examinations. In addition, they received limited training on how to conduct bacteriological and chemical examinations of fishery products where additional proof of spoilage was needed. A detailed manual of instruction for the inspection of fish canneries was developed for use by cannery inspectors working under the recently approved Peruvian food laws.

Intensive instruction was given in the examination of domestic canned products, especially bonito and sardines. The quality of the fish when caught and when canned, workmanship in canning, and physical examination of the container were all emphasized. Particular stress was placed on the

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 ABSTRACTER: Martin Heerdt

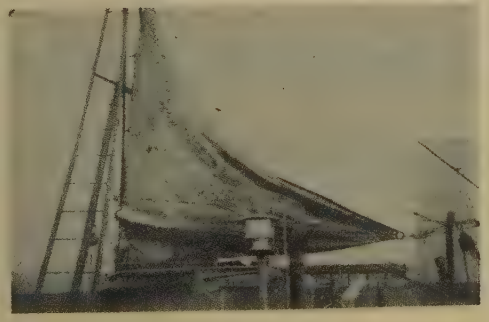
9.7 (Cross Reference: 0.6)

determination of spoilage or incipient spoilage, and the detection of faults in canning procedure.

Experimental work was initiated in the salting and smoking of fishery products for sale within Peru. It was demonstrated that a satisfactory dried salted product could be prepared even in a warm climate by the use of a good grade of salt in sufficient quantity, by reducing the moisture content of tne fish rapidly, and by overcoming the high atmospheric humidity during the curing period. Methods were developed for smoking low priced varieties such as flying fish and bonito roe. The resulting products had good keeping qualities and were very popular among the Peruvians. Best smoking results, from the standpoint of color and flavor, were obtained with mahogany chips and sawdust,algarroba wood, and wood from dead orange trees.

Non-technical publications on fish preservation were written in English and translated into Spanish for use in Peru. Recipes most likely to appeal to Peruvians, using low-cost species of fish and fish trimmings, were similarly prepared to encourage the use of fish in Peru. Lectures in fishery technology applied to South American conditions also were a part of the program.

2.119



3.239 DEOXYPENTOSE NUCLEIC ACID IN THE EXPRESSIBLE FLUID OF COD FILLETS

Love, R. M. (Torry Research Station, Aberdeen, Scotland)
Nature 173, No. 4403, 544-545 (March 20, 1954)

Fish fillets that have been allowed to stand for some time under humid conditions invariably exude a cloudy fluid or drip. If these fillets are pressed they lose fluid (expressible fluid) at a more rapid rate. Fillets that have been frozen and thawed exude somewhat larger quantities of drip or expressible fluid. This drip or expressible fluid is believed to consist almost entirely of intercellular fluid rather than cellular fluid.

Deoxypentose nucleic acid (DNA) occurs only in cell nuclei; therefore, the presence of any quantity of DNA in the expressible fluid should be indicative of cell rupture. The DNA content of samples of expressible fluid from fish treated in different ways was investigated using a modified Schmidt-Thannhauser (1945) separation procedure followed by a DNA phosphorus determination using the method of Berenblum and Chain (1938).

The expressible fluid from fresh undamaged fillets always contained about 0.12 mg. DNA phosphorus per 100 ml. which probably had its origin in nuclear material exuding from the severed cells at the cut surface of the fillets. Drip obtained without the application of pressure contained 0.4 mg. DNA phosphorus per 100 ml. A comparison of the two concentrations obtained indicated that the application of pressure merely caused an increase in the amount of intercellular fluid released.

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 ABSTRACTER: Martin Heerdt

3.230 LENT SPARKS GROWING POPULARITY OF FROZEN SEAFOOD

Anonymous
Food Engineering 26, No. 4, 144 (April, 1954)

Frozen prepared seafood specialties received extra emphasis during the lenten season when a number of new products and packages appeared on the market. Some of the new specialties being marketed by a Rockland, Maine firm in aluminum foil packages include creamed finnan haddie, lobster Newberg, creamed haddock, lobster bisque, and lobster chowder. The foil packages have crimped covers with directions prominently displayed for heating and serving in the original package. The words 'heat and eat' are a feature of these products and packages.

Frozen lobster thermador is packed in a rectangular carton opened by a flap at one end. This carton is overwrapped with cellophane after a paper label has been placed on top of the carton.

Frozen old-fashioned clam chowder is packed 12 ounces in either cardboard cups or cans by a New York firm. The containers are illustrated with a full rigged ship on a white background. The frozen clam chowder in cans is not sold under the same label as the frozen chowder in cardboard cups.

Another new item in the heat and eat product line is frozen New England style creamed codfish pie enclosed in a pastry shell and placed in an aluminum foil pie plate for convenience in heating and serving. This pie with its own plate is packed in a carton overwrapped with wax paper. The contents are attractively illustrated on the waxed paper overwrap.

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 ABSTRACTER: Martin Heerdt

6.3 STUDIES ON THE OCCURRENCE OF AMINO ACIDS, NIACIN AND PANTOTHENIC ACID IN MARINE ALGAE

Ericson, L. E. and Carlson, Blenda
Archives of Chemistry (Sweden) 6, No. 49, 511-522 (December 14, 1953) (In English)

The occurrence of amino acids, niacin and pantothenic acid has been investigated in a number of marine algae by means of paper chromatography and microbiological methods. The seasonal variations in cystine, tryptophane, β-alanine, niacin, and pantothenic acid in Alaria esculenta have been studied.

Twenty-two different amino acids have been found, among them glycine, α-alanine, β-alanine, α-amino-n-butyric acid, valine, leucine, iso-leucine, phenylalanine, tyrosine, serine, threonine, cystine, methionine, lysine, arginine, tryptophane, proline, histidine, aspartic acid, and glutamic acid. As well as these twenty amino acids, mono- and diiodotyrosine have been observed in the red alga Ceramium rubrum. Taurine has also been found and seems to occur in free form in the living alga. Cystine, tryptophane and β-alanine occur both in the free and the bound form. No significant qualitative variation in the amino acid composition of the different algae was noted. The experiments show that the composition of the algal protein undergoes great seasonal variations.

The niacin content of the algae investigated was generally quite high and varied from about 1 μg/g in Ceramium tenuicorne to about 99 μg/g dry weight in Alaria esculenta (January sample). The content of pantothenic acid was low with the exception of Chara tomentosa in which 12.5 μg/g dry weight was found. Both the niacin and the pantothenic acid contents show considerable seasonal variations.

 Author's summary

4.64 BEHAVIOR OF ANTIOXIDANTS DURING THE BAKING AND STORAGE OF PIE CRUST

Mahon, J. H. and Chapman, Ross A. (Food and Drug Laboratories, Ottawa, Canada)
Journal of the American Oil Chemists' Society 31, No. 3, 108-112 (March, 1954)

The authors periodically determined the keeping quality and the added antioxidant content of pie crust prepared from doughs containing lard to which various phenolic antioxidants and/or acidic synergists had been added. They extracted the fat from a portion of the crust and analyzed it for its peroxide value and added antioxidants.

The dough used in making the pie crust consisted of 100 parts of commercial pastry flour, 60 parts of fresh steam-rendered lard, and 50 parts of distilled water. The antioxidants and/or acid syngergists were dissolved in a few drops of propylene glycol and thoroughly mixed into the lard at 45°C. The lard was then cooled rapidly to 18°C. and creamed with half of the flour which also was at 18°C. The remainder of the flour was then mixed with the creamed portion, and the water, also at 18°C., was mixed in lightly. The dough was spread 1/4 inch thick in rectangular aluminum trays (11 x 10 x 3/8 inches) and uniformly baked in a 205°C. oven until lightly browned. Storage of the crust was at 61°C.

Propyl gallate could not be recovered from the pie crust. Various tests indicated that propyl gallate was destroyed or complexed by some component of the flour, possibly its metallic ion content. Lauryl gallate recoveries of 30 percent from dough and 20 percent from freshly baked pie crust were actually obtained. If the lauryl gallate was sprayed onto pie crust containing "Versene" (0.28 percent of the flour by weight) 64 percent could be recovered after about 4 hours at room temperature. According to the foregoing results, the loss of added antioxidant could be reduced and the keeping quality of the pie crust increased if a sufficient amount of a powerful metal deactivator was employed.

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 ABSTRACTER: Martin Heerdt

NATURE OF DRIP FROM COD MUSCLE

AMINO ACIDS IN MARINE ALGAE

FROZEN SEAFOOD SPECIALTIES

EFFECT OF BAKING ON ANTIOXIDANTS

6.3 (Cross Reference: 8.51)

4.64

Table II shows the effect of different antioxidant and synergistic combinations including "Versene" upon the time required for the fat of pie crust held at 61° C. to attain a peroxide value of 60.

About 2 to 6 percent of the nordihydroguaiaretic acid (NDGA) added to the lard could be recovered from the dough, whereas no NDGA could be recovered from the pie crust. Recoveries of butylated hydroxyanisole (BHA) from the dough were as high as 98 percent; however, in most instances only 80 to 92 percent recoveries were obtained. The loss of BHA was found to proceed at an ever-increasing rate during baking, due in part to steam distillation from the dough. Normal baking removed 15 to 20 percent of the BHA present.

Data on peroxide values are summarized and expressed in table II in terms of the time required at 61° C. for the fat in the crust to attain a peroxide value of 60 milli-equivalents per kilogram of fat. Acidic synergists produced no significant improvement in the keeping quality of pie crust. Lauryl gallate plus citric acid produced a significant improvement in the keeping quality of pie crust. "Versene" additions to the dough, followed by the spray application of a solution of lauryl gallate or propyl gallate plus citric acid, resulted in an increase in stability. Maximum stability in the pie crust was obtained by the addition of BHA plus citric acid to the dough; however, the further addition of propyl gallate, lauryl gallate, or NDGA to this dough did not produce any further increase in the stability of the crust.

TABLE II

Effect of Different Antioxidant and Synergistic Combinations Upon the Time Required for the Fat of Pie Crust Held at 61° C. to Attain a Peroxide Value of 60

Material added to lard	Time at 61° C. to attain a peroxide value of 60
	days
Control	4
CA	15
H_3PO_4 + Glycine + "Versene" (Acidic synergists)	15
High CA	7
NDGA + CA	-
PG + CA	-
CA (Baked) + PG (sprayed on pie crust)	7
High CA (Baked) + PG (sprayed on pie crust)	7
LG + CA	8
Versene (baked) + PG and CA (sprayed on pie crust)	15
Versene (baked) + LG and CA (sprayed on pie crust)	15
BHA + NDGA + CA	23
BHA + High CA	25
BHA + PG + CA	25
BHA + LG + CA	24
BHA + CA	25

Key to table

Additive	Add-ons expressed as percentage of the lard employed
CA	0.004 % anhydrous citric acid
High CA	0.400 % anhydrous citric acid
H_3PO_4	0.460 % phosphoric acid
Glycine	0.040 % amino acetic acid
Versene	0.460 % disodium dihydrogen ethylenediamine tetraacetate
PG	0.006 % propyl gallate
LG	0.00035% lauryl gallate
NDGA	0.010 % Nordihydroguaiaretic acid
BHA	0.0008 % 3-tert-butyl-4-hydroxyanisole
	0.0012 % 2-tert-butyl-4-hydroxyanisole

3.239

The concentrations of DNA phosphorus in fluid obtained from fillets pressed under standard conditions for 6 hours; or passed once through a domestic mixer and centrifuged at 3,500 times gravity for 30 minutes; or passed through a domestic mincer, a Latapie mincer, and centrifuged at 3,500 times gravity for 30 minutes, was, respectively, 0.124, 0.380, and 0.807 mg. per 100 ml. of fluid. These findings suggest that the domestic mincer tears the muscle fibers apart, whereas the Latapie mincer breaks up the ribers.

In a series of fillets that were frozen with increasing rapidity, DNA phosphorus levels rose gradually from 0.2 to 0.3 mg. per 100 ml. of fluid as the freezing rate increased, then rose suddenly to a sharp maximum of 0.6, and finally fell to a level of 0.2 as the rate of freezing increased still further. Microscopic examination showed that the 0.6 level corresponded with the entry of ice crystals into the muscle cells. When fillets were frozen very rapidly by immersing them in liquid oxygen or in CO_2 alcohol, the DNA phosphorus concentration rose to 0.5 mg. per 100 ml. The excessive interval pressure that arose when the freezing expansion of the centermost portion of the fillet occurred inside of the hard frozen outer layer probably was responsible for this rise. A similar effect occurred in a tightly packed box of fillets that was frozen from the two opposite faces.

3.230

Frozen cooked shrimp in hermetically sealed cans is still another recent addition to the seafoods line. These shrimp are cleaned, cooked, and seasoned before packing. By using cans instead of cartons dehydration is eliminated, a longer shelf life obtained, and the shrimp are ready to serve either cold or after heating.

4.66 THE ANTIOXIDANT AND ANTIPOLYMERIZATION PROPERTIES OF GOSSYPOL, DIANILINOGOSSYPOL, AND RELATED MATERIALS

Bickford, W. G.; Pack, F. C.; Castillon, L. E.; and Mack, C. H.
Journal of the American Oil Chemists' Society XXXI, No. 3, 91-93 (March, 1954)

Because of their availability from another investigation, gossypol, dianilinogossypol, and related materials were evaluated for their antioxidant and antipolymerization properties. The polyphenolic binaphthalene compound, gossypol, was obtained from acetone extracts of cottonseed pigment glands. This pigment was purified by crystallization from a diethyl ether-light petroleum naphtha mixture. Dianilinogossypol was prepared according to the method of Clark (1927).

Gossypol-glycine was prepared by combining nine parts by weight of gossypol with one part by weight of glycine, whereas gossypol-urea was prepared by combining equal parts by weight of gossypol and urea. In both instances the ingredients were combined in aqueous NaOH solution at pH 11, lowered to pH 7 with HCl, and the solutions lyophilized. The yellow, dried combination products were water-soluble and contained NaCl.

Gossypolaminobenzenethiol was prepared by adding 4 ml. of 2-aminobenzenethiol to 1 g. of gossypol dissolved in 20 ml. of diethyl ether. The product was washed with diethyl ether, dried, and repeatedly crystallized from hot benzene until a constant melting point was reached.

Each antioxidant tested was incorporated in 20 g. of lard and in 20 g. of cottonseed oil at a concentration of 0.05 percent with the aid of 1-3 ml. of purified absolute ethanol. The fortified substrates as well as the controls were aerated at 97.7° C. in clean test tubes at the rate of 2.33 ml. of purified air per second. At periodic intervals a 1-g. sample of lard and of oil was removed from

(over)

 ABSTRACTER: Martin Heerdt

0.38 THIAMINASE FROM FRESH-WATER, BRACKISH-WATER, AND SALT-WATER FISH

Deolalkar, S. T. and Sohonie, Kamala (Biochemistry Dept., Institute of Science, Bombay, India)
Nature 173, No. 4402, 489-490 (March 13, 1954)

Thiaminases from two different varieties of fish from three different groups were studied. The groups and species were as follows:

1. Fresh-water fish
   a. Khavale (Barbus sarana) b. Khavale (Labeo baggut Sykes)
2. Brackish-water fish
   a. Vaunshi (Mugil sp.) b. Tol (Hemirhamphus xanthopterus)
3. Salt-water fish
   a. Mandeli (Coilia dussumieri) b. Pedve (Sardinella fimbriata)

Using whole fish that had been ground in a mortar, the enzyme was extracted with water, filtered, and the filtrate tested for activity. The effect of hydrogen ion concentration on the inactivation of thiamine by thiaminases from different varieties of fish was studied in the range of pH 3.0 to 7.0 by using acetate and phosphate buffers, respectively. Five ml. of the water extract, 5 ml. of buffer solution, and 25 μg. of thiamine were mixed and incubated for 16 hours at 28° C. with toluene as a preservative. The thiamine remaining at the end of this period was estimated by the thiochrome method. Typical experimental data appears in figure 1 (this card, over). The 3 species omitted from figure 1 showed a similar pattern of activity.

(over)

 ABSTRACTER: Martin Heerdt

8.59 AN ACIDOGENIC CAROTENOID IN A BATHYPELAGIC NEMERTEAN WORM

Fox, Denis L. (Scripps Institution of Oceanography, LaJolla, California)
Nature 173, No. 4404, 583 (March 27, 1954)

Recently, there arose a rare opportunity to examine briefly the red-orange pigment from three freshly collected specimens of Nectonemertes mirabilis Verrill (one immature male and two females, 30-34 mm. long and 5 mm. wide). These were taken in a depth haul from 1,200 m. to the surface in the Santa Barbara Passage off the coast of Southern California and identified as members of this widely distributed species, usually encountered at depths from 500 m. down, in the North and the South Pacific Ocean.

The specimens, fixed in dilute formalin, then preserved in 70 percent ethanol, were examined within a week after capture. The deep red-orange pigment was concentrated in oil droplets in the digestive diverticula. In view of the unlighted habitat and the microcrustacean diet of this worm, it was of special interest to learn whether, as in numerous other marine carnivores, its richly stored pigment might belong to the oxygenated carotenoids.

The preserved worms had lost none of their bright color, but substitution of absolute ethanol readily leached the pigment out, imparting a red-orange color to the solvent and leaving the animals quite pale. The pigment was completely epiphasic, migrating quantitatively from the alcohol into light petroleum to give a yellow solution. However, after an hour's exposure to warm ethanolic potassium hydroxide, the pigment showed quantitative hypophasic behavior, thus reflecting the absence of carotenes and the original presence of esterified xanthophylls. Dilution effected the migration of a trace of yellow pigment into the petroleum, while the more copious red component now separated as a

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 Reprinted in part

1.015 ICE AND COLD STORAGE FACILITIES FOR NEW FISH HARBOR IN PAKISTAN

Anonymous
Industrial Refrigeration 126, No. 4, 10 (April, 1954)

A modern fish harbor, to include ice making and cold storage facilities, is planned for construction at Karachi, Pakistan. The ice making plant will have a capacity of 15 tons a day, and the cold storage, which will be divided into three rooms, each capable of holding 0° F., will total 7,000 cubic feet.

The project, which is planned to be completed in about three years, is expected to revolutionize the Pakistani fishing industry and to improve the living standards of the people through providing more fish as food; through mechanized boats that can reach the rich waters of the outer Arabian Sea; through modern refrigerating and cold storage equipment to better preserve the fish catch; through more jobs for Pakistani fishermen; more opportunities for future private investment in the fishing industry and secondary industries; and through the expansion of the market for Pakistani fish at home and abroad.

The fish harbor is expected to be the first of its kind in all Asia except Japan. Several United States and F.A.O. technicians are assisting in the project.

 ABSTRACTER: Roy C. Stevens

ANALYSIS OF ANTIOXIDANTS

CAROTENOID IN A MARINE WORM

THIAMINASE FROM FISH

PAKISTAN FISH HARBOR

8.59

potassium salt at the liquid interface. In its preferential solubility in alcohol, and in its reversible transference from alkaline or neutral alcohol to petroleum, the yellow component behaved like a neutral xanthophyll. Its quantity was insufficient for further study.

The red interfacial salt was washed with additional petroleum and was then readily dissolved in this solvent containing a little acetic acid. The yellow petroleum solution displayed, on shaking with water, the transient pinkish emulsion which characterizes other acidogenic carotenoids, such as astacene and metridioxanthin. The acid-free petroleum solution was evaporated in an inert atmosphere and the deep orange residue was dissolved in redistilled pyridine (b.p. 114-116°C.). This red-orange solution exhibited a single, discrete absorption peak whose steep, symmetrical shape and maximum at 490 mμ differentiated it from astaxanthin or its artefact, astacene, which show a less sharp maximum at 500 mμ in the same solvent. In its spectrum the nemertean pigment recalls a similar acidogenic carotenoid from the marine shrimp Hippolyte and another from the anemone Metridium.

Evidently this deep-sea pelagic ribbon-worm owes its bright red-orange color to the presence of an acidogenic carotenoid ester, related to but not identical with astaxanthin. The principal carotenoid and the accompanying traces of esterified neutral xanthophyll doubtless originate from the animal's consumption of planktonic crustaceans and other pelagic fauna. The finding of rich stores of oxygenated carotenoids, unaccompanied by any carotene hydrocarbons, adds to the growing list of xanthophyll-selecting marine carnivores, a widely occurring species the habitat of which is limited to great oceanic depths.

4.66

each tube, and the peroxide value was determined according to the method of Moore and Bickford. The antioxidant activity of gossypol and related substances in lard and in cottonseed oil is shown in table I, below.

The effectiveness or lack of antipolymerization activity of the various inhibitors when incorporated in styrene, vinyl acetate, or methyl acrylate was measured at selected concentration levels as change in viscosity.

The bubble tubes containing the monomer and selected concentration levels of inhibitor were subjected to heat or ultraviolet light as the polymerizing treatment and then compared at intervals with the Gardner-Holdt bubble tube standards. The extent of polymer formation as indicated by an increase in viscosity is shown in table II, below.

TABLE I

Comparison of Antioxidant Activities of Gossypol and Various Other Inhibitors in Lard and Cottonseed Oil

Antioxidant[a]	Lard		Cottonseed oil	
	AOM hours[b]	Antioxidant index[c]	AOM hours[b]	Antioxidant index[c]
Control	9.0	1.0	8.9	1.0
Hydroquinone	.....	...	35.0	3.9
Gossypol	75.0	8.3	14.5	1.6
Dianilinogossypol	52.0	5.8	12.2	1.4
Gossypol-urea	55.5	6.1	13.3	1.5
Gossypol aminobenzene-thiol	66.0	7.3	12.5	1.4
Gossypol-glycine	49.0	5.4	13.4	1.4

[a] The antioxidants were used in a concentration of 0.05%.
[b] Number of hours required by the sample to acquire a peroxide content of 100 milli-equivalents per kilogram of fat during aeration at 97.7°C. with an air flow of 2.33 ml./sec.
[c] Ratio of AOM hours of stabilized to unstabilized substrate.

TABLE II

Comparison of Antipolymerization Activities of Gossypol, Dianilinogossypol and Hydroquinone in Various Monomers

Inhibitor	%	Styrene[c]	Vinyl acetate[d]	Methyl acrylate[d]
Control[e]	.....	68	60	10
Gossypol	0.01	68	60	24
Gossypol	0.05	142	>160[e]	72
Dianilinogossypol	0.01	114	90	43
Dianilinogossypol	0.05	>164[f]	>160[e]	96
Hydroquinone	0.01	90	60	19
Hydroquinone	0.10	142	160	19

[a] Expressed as the time in hours required at 70°C. to attain a viscosity of 148 poises measured at 25°C.
[b] Expressed as the number of hours required under ultraviolet irradiation for the samples to attain a viscosity of 148 poises measured at 25°C.
[c] All viscosities were measured by means of a Gardner-Holdt Bubble Viscometer.
[d] Substrate without added inhibitor.
[e] Viscosity still less than 0.50 poises after 160 hours.
[f] Viscosity measured 80.4 poises at 164 hours.

0.38

Figure 1 shows that the fresh-water species Barbus sarana contains only one enzyme exhibiting optimum thiaminase activity at pH 7.0 or above. In the case of brackish-water Mugil sp. and salt-water Coilia dussumieri the enzyme exhibited optimum activity at pH 3.6, 5.6, and 7.0. The latter findings indicate the possibility of at least two thiaminases in each species, one having optimum activity in the neutral or slightly alkaline range and one in the acid range.

Enzyme extracts from all three species of fish shown in figure 1 lost the greater part of their activity on dialysis. Activity could be restored in all cases by the addition of boiled original extract, thus confirming the presence of a coenzyme. The dialyzates of the thiaminases having optimum activity in the acid range were the only ones whose activity could be restored by the addition of M/100 manganese and cobalt salts; these enzymes were thereby confirmed as being totally different from the enzyme having optimum activity at pH 7.0. Work on the separation of the three enzymes by paper chromatography is in progress.

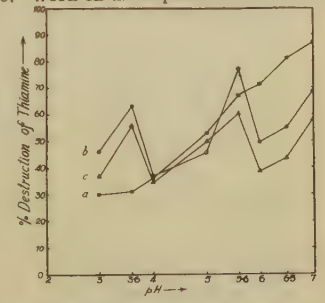

Fig. 1. Effect of pH on thiaminase from fish: (a) *Barbus sarana*, fresh-water fish, (b) *Mugil* sp., brackish-water fish, (c) *Coilia dussumieri*, salt-water fish

0.5 YEASTS ISOLATED FROM SHRIMP

Phaff, H. J.; Mrak, E. M.; and Williams, O. B.
Mycologia 44, 431-435 (1952)
Food Science Abstracts 25, No. 6, 646 (November, 1953)

0.6 A MICRO-METHOD AND APPARATUS FOR THE MULTIPLE DETERMINATION OF RATES OF DESTRUCTION OF BACTERIA AND BACTERIAL SPORES SUBJECTED TO HEAT

Stern, Joseph A. and Proctor, Bernard E.
Food Technology 8, No. 3, 139 (March, 1954)

A micro-method and an apparatus for determining the thermal resistance of bacteria and bacterial spores are described. The apparatus treats ten or more samples simultaneously and can be used over a wide range of temperatures. The bacteriological procedure utilizes the apparatus described. Data can be accumulated rapidly and in sufficient quantity to establish confidence limits of the slopes of rate-of-destruction curves.

0.6 POINT FOUR ACTIVITIES IN FISHERY TECHNOLOGY IN PERU

Jarvis, Norman D.
Food Technology 8, No. 4, 177-179 (April, 1954)

(Abstract of this article appears under 9.7 page 15)

1.1 FISH HANDLING AND PROCESSING IN U.S.A.: CANNING MACKEREL

Empey, W. A.
Fisheries Newsletter 12, No. 11, 13, 15 (November, 1953)

(Abstract of this article appears under 3.33 page 15 - May 1954 issue)

1.1 AUSTRALIAN TUNAS. DISTRIBUTION: IDENTIFICATION

Anonymous
Fisheries Newsletter 13, No. 2, 5-8 (February, 1954)

1.2 FISH HANDLING AND PROCESSING IN U.S.A.: CANNING MAINE SARDINES

Empey, W. A.
Fisheries Newsletter 12, No. 11, 13 (November, 1953)

(Abstract of this article appears under 3.33 page 15 - May 1954 issue)

1.2 PRODUCTION OF HERRING MEAL

Various authors
Meldinger fra SSF, No. 1, 12-21 (January, 1954)

(Abstract of this article appears under 6.132 page 13)

1.82 PREPARING CLAM CHOWDER

Anonymous
Food Engineering 26, No. 2, 181-182 (February, 1954)

(Abstract of this article appears under 3.33 page 1)

1.85 HOW TO AVOID EXCESSIVE WEIGHT LOSS IN COOKING SHRIMP

Fieger, E. A.
Canner 118, No. 14, 9-11 (April 5, 1954)

(Abstract of this article appears under 2.3 page 11)

1.85 PRESERVATION OF SEMI-DRIED PRAWNS

Venkataraman, R.; Sreenivasan, A.; and Vasavan, A. G.
Journal of Scientific and Industrial Research 12A, No. 10, 473-474 (1953)

(Abstract of this article appears under 3.7 page 11)

2.111 HOW TO CARE FOR TRAWL ROPE IN OCEAN FISHING

Ramsey, R. P.
Pacific Fisherman 52, No. 2, 34, 36 (February, 1954)

2.113 CATHODIC PROTECTION AS APPLIED TO ROYAL CANADIAN NAVAL VESSELS IN ACTIVE SERVICE

Barnard, K. N.
Chemistry & Industry, No. 7, 172-182 (February 13, 1954)

2.113 CATHODIC PROTECTION. ITS APPLICATION TO SHIPS AND ESTABLISHMENTS OF THE ROYAL NAVY

Crennell, J. T.
Chemistry & Industry, No. 8, 204-209 (February 20, 1954)

2.114 MODERN PROPULSION PLANTS FOR FISHING VESSELS

Schmidt, K. and Schumacher, Th.
World Fishing 2, No. 12, 477-478 (December, 1953)

2.115 GOVERNMENT REGULATIONS AND A NEW FISHING-BOAT DESIGN

Kristensen, Helge
Canadian Fisherman 41, No. 2, 18-20, 31 (February, 1954)

2.115 MODERN DIESEL ENGINE TRAWLERS

Kolbeck, Robert
World Fishing 2, No. 12, 493-494 (December, 1953)

2.117 FISHERIES RESEARCH VESSEL ALISTER HARDY OF THE FISHERIES RESEARCH UNIT, UNIVERSITY OF HONG KONG

Anonymous
Nature 172, No. 4391, 1170-1171 (December 26, 1953)

The Alister Hardy launched on November 7, 1953 has a length of 66 feet, a beam of 17 feet 10 inches, a fully equipped laboratory for the immediate examination and classification of sea life, and a tank for keeping specimens alive.

3.238 FRESH OYSTERS IN CANS

Anonymous
Canner 118, No. 14, 36 (April 5, 1954)

Frozen fresh oysters are now being introduced in vacuum pack cans. The hermetically sealed can and vacuum give full protection to the oysters against deterioration and loss of quality normally caused by dehydration.

3.238 SHRIMP FROZEN IN CANS

Anonymous
Canner 118, No. 12, 33 (March 22, 1954)

After cooking and seasoning, the shrimp is put into cans which are closed under high vacuum. Next they go into an air-blast tunnel where they are rapidly frozen in sub-zero temperatures.

3.239 RATES OF FREEZING AND THAWING MEATS

Dunker, C. F. and Hankins, O. G.
Food Technology 7, No. 12, 505 (December, 1953)

The effectiveness of air blast, plate, and still air freezing at ranges from +2° F. (-17°C.) to -80° F. (-62° C.) as well as subsequent thawing at 40° F. (4° C.), 70° F. (21° C.), and 90° F. (32° C.) were investigated.

3.33 ANTIBIOTICS IN FOOD PROCESSING

Lewis, J. C.; Michener, H. D.; Stumbo, C. R.; and Titus, Dudley S.
Journal of Agricultural and Food Chemistry 2, No. 6, 298-302 (March 17, 1954)

(Abstract of this article appears under 3.12 page 11)

3.33 FISH HANDLING AND PROCESSING IN U.S.A.: CANNING CALIFORNIA SARDINES

Empey, W. A.
Fisheries Newsletter (Australia) 12, No. 10, 15 (October, 1953)

3.33 FISH PROCESS PATENTED

Anonymous
Canner 118, No. 15, 1 (April 12, 1954)

A process for smoking and canning whole delicate fish and fish fillets substantially without breakage was patented recently by Charles S. Ash of San Francisco. Fish are sealed unbroken in the cans together with a liquid smoke carrier in which smoke has been absorbed. The smoke is re-volatilized when the can is subjected to heat, thus permeating the sealed fish.

3.4 FISH PROCESS PATENTED

Anonymous
Canner 118, No. 15, 1 (April 12, 1954)

(Abstract of this article appears under 3.33 page 23)

3.4 ANTIOXIDANT EFFECT OF LIQUID SMOKES

Watts, Betty M. and Faulkner, Marian
Food Technology 8, No. 3, 158-161 (March, 1954)

(Abstract of this article appears under 4.64 page 5)

3.4 BACTERICIDAL AND DRYING EFFECTS OF SMOKING ON BACON

Gibbons, N. E.; Rose, Dyson; and Hopkins, J. W.
Food Technology 8, No. 3, 155 (March, 1954)

Destruction of bacteria and loss in weight of bacon during experimental smoking were found to be correlated to some extent with smoke density, duration of smoking, temperature of the meat, and humidity of the smokehouse.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemistry and Industry
Commercial Fisheries Review
Commercial Fisherman
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fisherman
Fishermen's News
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Foreign Commerce Weekly
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

4.4 SOME FACTORS AFFECTING THE DECOMPOSITION OF FRYING FATS

Carlin, G. T.; Hopper, R. P.; and Rockwood, B. N.
Food Technology 8, No. 3, 155 (March, 1954)

Hydrolysis, polymerization, and oxidation take place simultaneously at elevated temperatures. Loss of rancidity resistance, color, and flavor changes are shown to be associated with oxidative changes.

4.82 USE OF ANIMAL FATS IN FEEDS

Kraybill, H. R.
Feedstuffs 25, No. 49, 52 (December 5, 1953)

4.90 ANIMAL FATS AS A SOURCE OF ENERGY IN RUMINANT RATIONS

Dowe, Tom
Flour and Feed 54, No. 10, 13 (March, 1954)

(Abstract of this article appears under 4.82 page 5)

6.0 UTILIZATION OF ALASKAN SALMON CANNERY WASTE. PARTS I & II

Stansby, Maurice E. and Associates
Special Scientific Report: Fisheries No. 109

6.133 MARINE OILS WITH PARTICULAR REFERENCE TO THOSE OF CANADA

Bailey, B. E.
Fisheries Research Board of Canada, Bulletin No. 89 (1952) 413 pp.

(Abstract of this article appears under 4.0 page 15 - April 1954 issue)

6.139 HEAT STABILITY OF AMINO ACIDS IN STICKWATER

Anonymous
Meld. SSF, No. 5, 97-99 (1952)
Food Science Abstracts 25, No. 6, 644 (November, 1953)

6.3 FOOD FROM THE SEA

Weiss, Francis Joseph
Journal of Agricultural and Food Chemistry 1, No. 13, 822-828 (September 16, 1953)

(Abstract of this article appears under 0.6 page 9 - May 1954 issue)

6.51 EFFECT OF ANTIOXIDANT ADDITION TO FISH WASTE ON FOLIC ACID AND CRUDE PROTEIN CONTENT

Hastings, W. H.
Southern Fisherman 13, No. 10, 114 (October, 1953)

(Abstract of this article appears under 4.61 page 19 - December 1953 issue)

6.52 ALASKA POLLOCK: PROXIMATE COMPOSITION; AMINO ACID, THIAMINE, AND RIBOFLAVIN CONTENT; USE AS MINK FEED TECHNICAL NOTE NO. 27

Landgraf, R. G.
Commercial Fisheries Review 15, No. 7, 20-22 (July, 1953)

(Abstract of this article appears under 8.50 page 17 - December 1953 issue)

9.14 DISTILLERS FEEDS USED FOR FISH

Anonymous
Feedstuffs 26, No. 13, 62 (March 27, 1954)

9.15 DISEASE AS A FACTOR IN NATURAL MORTALITY OF MARINE FISH

Oppenheimer, Carl
FAO Fisheries Bulletin 6, No. 6, 215-222 (November/December, 1953)

9.15 THE PACIFIC SEA LAMPREY

Pike, G. C.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 97, 3-5 (December, 1953)

9.19 EFFECT OF CLIMATIC CHANGES ON FISH STOCKS

Anonymous
Atlantic Fisherman 35, No. 2, 20, 40-41 (March, 1954)

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